Equipment for neonatal and premature infants: Incubator

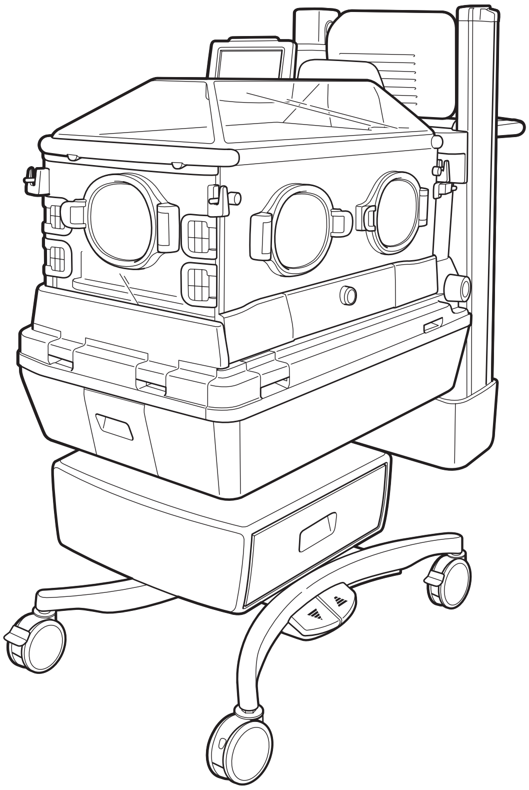
Atom Infant Incubator Model 100

ORIGINAL

CE 0123

Dual Incu i

Service Manual & Parts List



TO THE OPERATOR AND THE PERSON IN CHARGE OF MAINTENANCE AND CARE OF THE UNIT:

- This Manual describes various inspections needed to ensure proper operation of the Dual Incu *i*, including instructions for troubleshooting, those procedures to change certain settings which are not mentioned in the Operation Manual, and important points to bear in mind when handling the unit.
- Various inspections, including periodical inspection, are described in detail in this Manual. They should be carried out only by those who are fully familiar with the operation of the unit, having adequate technical knowledge and skills required in inspecting the unit.
- If repairs seem to be required as a result of any inspection described in this Manual, either personnel with more advanced knowledge and skills should undertake the repair or you should contact your local Atom representative for repair service.

ATOM

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INTRODUCTION

This Service Manual describes procedures for inspecting, repairing and changing the settings of the Dual Incu *i*. It also describes precautions and troubleshooting in alarm conditions. The procedures described in this Service Manual should be carried out only by personnel trained in electricity and the operation of the unit. Neither Atom Medical Corporation nor its representative will be responsible for the quality and performance of the unit if the unit should not be handled as instructed or if unauthorized parts should be used in repairs. It should be noted that any responsibility arising from inspecting, repairing or changing the settings of the unit lies with the person who carried it out.

Read this Service Manual carefully and familiarize yourself thoroughly with its contents before inspecting, repairing or changing the settings of the unit. Keep this Manual where it is readily accessible for reference when needed.

For more detailed information on inspecting, repairing and changing the settings of the unit, contact your local Atom representative.

Read the Operation Manual thoroughly before using the Service Manual.

SAFETY INFORMATION

Please read the Manual carefully before operating the unit. Please follow the instructions when operating the unit.

1 Basic Instructions

1. Medical institutions are responsible for the maintenance, inspection and care of the unit.
2. When you choose to have the unit maintained and inspected or when the unit is found to be in need of repairs from the results of inspection, consult your local Atom representative and take one of the following measures.
    1) Ask someone who has completed a training course specified by Atom and who has sufficient technical knowledge and skills to do the work.
    2) Ask Atom to send its service engineer if a person who has completed a training course specified by Atom and who has sufficient technical knowledge and skills is not available.
    3) Ask Atom for its approval of returning the unit for repair service.
3. Follow the instructions for safety.
   Read the operating precautions thoroughly before operating the unit.
4. Inspect the unit on a periodical basis.
   Periodical inspection is needed to use the unit in the optimum condition.
5. Ensure that the unit will not be used if it is found to be defective.
   Take proper measures to ensure that a defective unit will not be used by mistake before it is properly inspected, repaired and has its settings changed for normal operation. Such measures include indicating on the unit that it is under inspection/repair and keeping it away from other devices that function correctly.

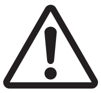
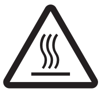
2 Definitions of Warning Indication

Three levels of warning indication are used throughout this Service Manual & Parts List and on the unit. They are defined as follows.

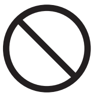
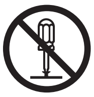
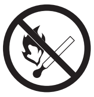
⚠**DANGER:**	A **DANGER** notice indicates **an immediately hazardous situation** which, if not avoided, will result in death or serious injury, serious damage to property such as total loss of use of equipment, or fire.
⚠**WARNING:**	A **WARNING** notice indicates **an indirectly (potentially) hazardous situation** which, if not avoided, will result in death or serious injury, serious damage to property such as total loss of use of equipment, or fire.
⚠**CAUTION:**	A **CAUTION** notice indicates a hazardous situation which, if not avoided, can result in **minor or moderate injury, partial damage to equipment, and loss of data stored in computers**.

3 Definition of Symbols

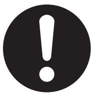
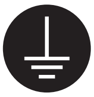
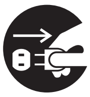
1. Symbols to indicate danger, warning or caution

Symbol	《Title》 and indication
	**《General attention》** Indicates unspecified general danger, warning or caution.
	**《Caution: Hot surface》** Indicates that the surface can be dangerously hot under certain conditions.

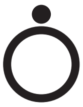
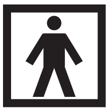
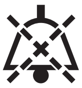
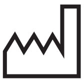
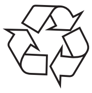
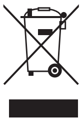
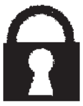
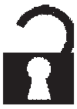
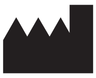
2. Symbols to prohibit action

Symbol	《Title》 and indication
	**《General prohibition》** Indicates unspecified general prohibition.
	**《Prohibition of disassembly》** Indicates prohibition of disassembly of the unit where it may cause an electric shock or other hazards.
	**《Prohibition of use of fire》** Indicates prohibition of use of fire where an external use of fire may cause the unit to ignite under certain conditions.

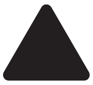
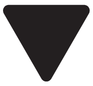
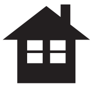
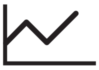
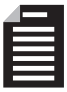
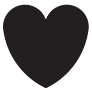
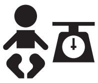
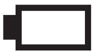
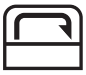
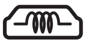
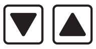
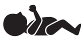
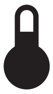
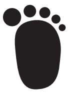
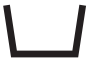
3. Symbols to give instructions for action

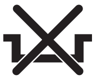
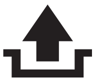
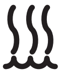
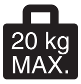
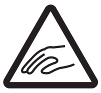
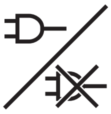
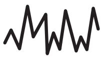
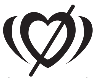
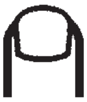
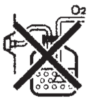
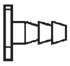
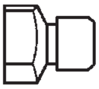
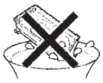
Symbol	《Title》 and indication
	**《General instruction》** Indicates unspecified general action on the part of the user.
	**《Connect a ground wire》** Instructs the user to connect the ground wire without fail where the unit is provided with a ground terminal.
	**《Remove the power plug from the power outlet》** Instructs the user to remove the power plug from the power outlet in the case of malfunction or when there is a threat of lightning.

4. Symbols of international standards (IEC)

Symbol	《Title》 and indication
|	**《Power on》** Indicates in relation to the power switch that the device is connected to the power source.
○	**《Power off》** Indicates in relation to the power switch that the device is not connected to the power source.
⊙	**《Equipment partially on》** Indicates that a part of the device is “ON.”
	**《Equipment partially off》** Indicates that a part of the device is “OFF.”
	**《Type BF applied part》** Indicates that the device is classified as Type BF in terms of the degree of protection against an electric shock.
	**《Bell silenced》** Indicates either a control switch to silence the bell permanently or temporarily, or that the bell is silenced.
	**《Date of manufacture》** Indicates the date when the unit was manufactured in the factory.
	**《Recyclable (battery)》** Indicates that recycling is recommended.
	**《WEEE symbol》** In the EC area, an electrical and electronic product falling in one of the categories specified by “DIRECTIVE 2002/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on Waste Electrical and Electronic Equipment (WEEE)” should be disposed of in a manner consistent with relevant laws and regulations. This symbol indicates that the above-mentioned requirement applies to this product.
	**《Locked》** Indicates a locked condition.
	**《Unlocked》** Indicates an unlocked condition.
	**《Manufacturer》** This symbol indicates the name and the address shown adjacent to the symbol is of the manufacturer.
EC | REP	**《Authorised representative in the european community》** This symbol indicates the name and the address shown adjacent to the symbol is of the authorised representative in the European Community.

5. Other symbols

Symbol	《Title》 and indication
	**《Setting》** Indicates that a setting is increased.
	**《Setting》** Indicates that a setting is decreased.
	**《Main screen display switch》** Indicates a switch to display the main screen.
	**《Trend screen display switch》** Indicates a switch to display the trend screen.
	**《Menu screen display switch》** Indicates a switch to display the menu screen.
	**《Pulse oximeter screen display switch》** Indicates a switch to display the pulse oximeter screen or the function related to the pulse rate.
	**《Weight screen display switch》** Indicates a switch to display the weight screen or the function related to weighing the infant.
	**《Battery》** Indicates whether the incubator is being powered by a battery or not.
	**《Incubator air circulation》** Indicates the function related to air circulation in the incubator in the incubator mode or that the incubator is in manual control.
	**《Radiant warmer》** Indicates the heater output in the radiant warmer mode or that the radiant warmer is in manual control.
	**《Setting》** Indicates set values or the setting procedure.
	**《Skin temperature》** Indicates the function related to the infant's skin temperature or that the incubator is in servo control.
	**《Temperature》** Indicates, with this symbol alone or with other symbols, a detected temperature or a set temperature alarm.
	**《Peripheral temperature》** Indicates the function related to the infant's peripheral temperature (skin temperature 2).
	**《Low water level/no water》** Indicates that there is little or no water in the humidity chamber.

Symbol	《Title》 and indication
	**《Defective humidity chamber》** Indicates that something is wrong with the humidity chamber.
	**《Humidity chamber off》** Indicates that the humidity chamber is not attached properly.
	**《Humidity》** Indicates the function related to humidity.
O_2	**《Oxygen》** Indicates the function related to oxygen.
	**《Load capacity》** Indicates the maximum load capacity.
	**《Avoid getting caught》** Indicates that the user must avoid getting caught in the gap in the device.
	**《AC power indicator》** The indicator lamp comes on in green when the unit is connected to the AC power source. It comes on in red when no power is supplied to the unit.
 (Nellcor)	**《Interference》** Indicates that interference exists.
 (Nellcor)	**《Pulse search》** Indicates that no pulse is detected.
≡%SpO$_2$	**《Fast response mode indicator》** Indicates that the response mode of the pulse oximeter is set to “Fast.”
SatSeconds	**《SatSeconds display》** Displays the selected SatSeconds alarm limit setting.
	**《Press》** Indicates that the lock function will be released when the key with this symbol is pressed.
	**《No humidified oxygen》** Indicates that humidified oxygen must not be supplied.
	**《Oxygen supply port 1》** Indicates the oxygen supply port when oxygen is supplied through the flowmeter.
	**《Oxygen supply port 2》** Indicates the oxygen supply port for the piping connecting hose when the oxygen controller is used.
	**《Do not immerse》** Indicates that the humidity chamber must not be immersed in water.

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[1] Operating Precautions

Please follow the operating instructions described in this Service Manual & Parts List for the safe use of the unit. The unit should be operated only by those who have been trained and instructed properly in its operation. The unit should be operated only for its intended use.

1-1. ⚠ DANGER

Death or serious injury, damage to equipment or a fire will result if the instructions given below are not followed.

Only those who have been properly trained should operate the unit.

Be sure to keep the admittance panels and the access ports closed when the unit is in use.
Using the unit with an admittance panel or an access port left open may cause the infant to fall out of the baby compartment. Be sure to close the admittance panels and the access ports when performing phototherapy on an infant inside the incubator.

Monitor the infant’s skin temperature when operating the unit.

If the incubator air temperature should rise during phototherapy, proceed with the phototherapy in the radiant warmer mode or after placing the infant in a cot or an open-type incubator (an infant warmer), as directed by the doctor.
Since a mature infant emits much heat, the incubator air temperature may rise if you place the infant in the incubator and perform phototherapy. The incubator air temperature may also rise if you use multiple phototherapy units at the same time or if the room temperature is high. In such a case, proceed with the phototherapy in the radiant warmer mode or after placing the infant in a cot or an open-type incubator, as directed by the doctor. Take sufficient care when using a cot, as it becomes difficult to observe the infant. Alternatively, placing an ice bag inside the incubator has the effect of decreasing the incubator air temperature.
However, be sure to close the admittance panels and the access ports in this case also.

Do not leave the unit unattended when an admittance panel or an access port is open.
If an admittance panel or an access port is left open, the infant may fall out of the baby compartment and get fatally injured. Never leave the unit unattended when an admittance panel or an access port is open.

Stop using the unit immediately and seek repair if an admittance panel, a snap-open access port or a press lever should be found loose or faulty in any way.
The infant may fall out of the baby compartment.

Never place a body warmer or any other possible ignition source in or near the unit.
Use of oxygen will increase the risk of explosion or fire. Body warmers or other devices in which fire is used or which will generate a spark may cause an explosion or a fire if used near the unit.

Do not use the unit in the presence of a flammable anesthetic gas.
The unit may cause an explosion or a fire if used in the presence of such a gas.

Do not use ether, alcohol or any other ignitable substance.
Even a small amount of ether, alcohol or other ignitable substances may cause a fire when mixed with the oxygen in the incubator.

Do not hang any flammable materials on the radiant warmer.
It may cause a fire.

Ground the unit securely.
Otherwise, a leakage current may cause an electric shock. In order to complete the ground connection, connect the power cord only to a properly grounded 3P power outlet including a ground terminal. Do not operate the unit if you have any doubt about its ground connection.

Do not use a device generating high frequency near the unit.
To prevent malfunction of the unit due to jamming, do not use electric surgical knives, portable and mobile communication equipment and other devices which generate high frequency near the unit during its operation.

Analyze arterial gas levels repeatedly when a high oxygen environment is required.
When the infant requires a high oxygen environment, it is extremely important and essential to periodically analyze arterial gas levels in order to maintain the desired oxygen concentration in the incubator. Follow the doctor's instructions in measuring the oxygen concentration because ignoring essential requirements may increase the risk of retinopathy of prematurity and other adverse effects.

Do not give a shock to the unit or let it hit anything.
The screws or fixed parts may become loose.

The heaters are consumables. If the heaters are to be used beyond their expected life span, overall repairs including replacement of parts must be carried out.

1-2. ⚠ WARNING

Death or serious injury due to a fire or an electric shock will result if the instructions given below are not followed.

Be sure to follow the doctor's instructions in setting the incubator air temperature or the infant's skin temperature.

Be sure to follow the doctor's instructions in setting the relative humidity in the incubator.

Be sure to follow the doctor's instructions in supplying oxygen.

Be sure to follow the doctor's instructions in setting the oxygen concentration in the incubator.

Use only oxygen for medical use.

Be sure to bear in mind the following precautions during oxygen supply.

- Do not place a body warmer, a flashlight, oils and fats, or flammable vaporizable matters in the incubator.
- Use pure cotton for the infant's clothing, bed sheets, etc. Do not use any material that is easily charged with static electricity.
- Use pure cotton or fire-proof materials for the clothing of doctors, nurses and ambulance staff who handle this unit.

Bear in mind the following precautions while using oxygen supply equipment.

- If oil, grease or a grease-like substance should get in contact with pressurized oxygen, a violent spontaneous ignition may occur. Do not let such substances stick to the oxygen pressure regulator, the oxygen cylinder valve, piping, connections and other parts of oxygen supply equipment.
- On a high-pressure oxygen cylinder, use only a tested pressure reducing valve or pressure regulating valve indicated specifically for oxygen supply. Do not use such a valve for any gas other than air or oxygen. It is dangerous to use a valve to supply a gas other than air or oxygen and then to supply oxygen again.

If the oxygen sensor should break or get damaged, the electrolyte inside may leak out of the sensor. If you should come in contact with the electrolyte, wash it away immediately and thoroughly with copious amounts of water.

Smoking is prohibited in the room where the unit is installed.

Do not place any possible ignition sources in the room.

Avoid damaging the power cord.

A damaged power cord may cause a fire or an electric shock.

- Do not get the power cord caught between the unit and the wall, a shelf or the floor.
- Do not place the power cord near a heating apparatus or heat it.
- Do not put anything heavy on the power cord.
- Always grasp the power plug with your hand to remove the power cord from the power outlet. A damaged power cord should be replaced immediately with a new one.

Use only the power cord supplied with the unit.

Otherwise, a fire or an electric shock may result.

Before cleaning and disinfecting the unit, be sure to turn the power switch off, remove the power plug, and allow the incubator air temperature and the heater temperature to drop sufficiently.

Do not touch the power plug with a wet hand.

Touching the power plug with a wet hand may cause an electric shock.

Do not touch the heaters during use or shortly after use.

The heaters are so hot during use and shortly after use that you may get burned. Allow the heaters to cool down sufficiently before touching them.

Do not disassemble or modify the unit.

Disassembling or modifying the unit may cause a fire, an electric shock or injury.

🚫 **Do not install the unit where it will be exposed to excessive humidity, dust or steam.**
Installing the unit in such a place may cause a fire or an electric shock.

❗ **The power outlet should be located near the unit to prevent accidental contact with a trailing power cord. Use a separate power outlet for each unit.**

🚫 **Do not put many loads on one power outlet.**

⏚ **In order to complete the ground connection, connect the power cord only to a properly grounded 3P power outlet including a ground terminal.**

🚫 **Do not operate the unit if you have any doubt about its ground connection.**

⏚ **Ground peripheral electric equipment securely.**

🚫 **Never connect the unit to a power outlet other than that specified.**

❗ **The unit should be serviced only by qualified personnel.**

❗ **Be sure to inspect the unit at the start of each day.**
Operating the unit without inspecting it at the start of each day may let a defect pass unnoticed and cause a potentially unfavorable outcome.

❗ **Check for conformity to the applicable standard if the unit is going to be connected to another medical device for use as a system.**
Accessory equipment connected to the analogue and digital interfaces must comply with the relevant IEC standards (e.g. IEC 60950 for data processing equipment). Furthermore all configurations should comply with IEC 60601-1-1. But the items that are not specified as part of the system should not be connected. Anybody who connects additional equipment to the signal input or signal output configures a medical system, and therefore should make the medical system comply with the requirements of 60601-1-1 on his or her own responsibility. If in doubt, consult your local Atom representative.

1-3. ⚠ CAUTION

Injury or damage to surrounding objects may result if the instructions given below are not followed.

❗ **Be sure to clean and disinfect the unit before using it for the first time after purchase.**
The unit is shipped without being disinfected.

❗ **During standby in the incubator mode, be sure to always preheat the unit in order to keep the incubator air temperature stable.**

❗ **During standby in the radiant warmer mode, be sure to always preheat the unit in order to keep the mattress surface temperature stable.**

❗ **Place the infant in the incubator only after the incubator air temperature has stabilized.**

When feeding the cords and tubes into the unit, be very careful not to let them wind or tighten around the patient.

Do not hang any cables or infusion tubes on the canopy or the canopy arm. Do not pass them above the canopy.

Do not twist or pull the cords by force.
If any defect should be found, ask an expert for repair without attempting to repair it yourself.

Remove the power plug from the power outlet before moving the unit to another place or when the unit is not going to be used for a long time.
Moving the unit to another place with the power plug connected to the power outlet will damage the power cord and may cause a fire or an electric shock.

Remove the power plug from the power outlet before cleaning and disinfecting the unit.
Cleaning and disinfecting the unit with the power plug connected to the power outlet may cause an electric shock.

Install the unit on a stable surface.
Installing the unit on an unstable platform or a tilted surface will cause it to fall or drop and may injure someone. Therefore, before installing the unit, make sure that the place where the unit is to be installed is stable and strong enough to support the weight of the unit.

Install the unit out of reach of small children.

Do not operate the radiant warmer covered with a cloth, etc.
Operating the unit covered with a cloth or pressed tightly against a wall may cause a fire or an electric shock due to overheating.

When performing phototherapy on the infant in the incubator, pay special attention to the infant's skin temperature and the incubator air temperature during the treatment.
The infant's skin temperature and the incubator air temperature may rise due to the radiant heat generated by the phototherapy unit.

Do not install the unit in direct sunlight or near a heating apparatus.

Do not expose the unit to extraordinarily high temperature or excessive humidity.

Do not place anything heavy on the unit.

Do not place anything on the canopy.

Do not lean on the radiant warmer. Do not apply more force than is necessary to the radiant warmer.

Do not press strongly or rub the operation panel of the display.
Pressing it strongly or rubbing it may damage the display or cause it to malfunction.

Be careful not to let any medical fluid adhere to the display.

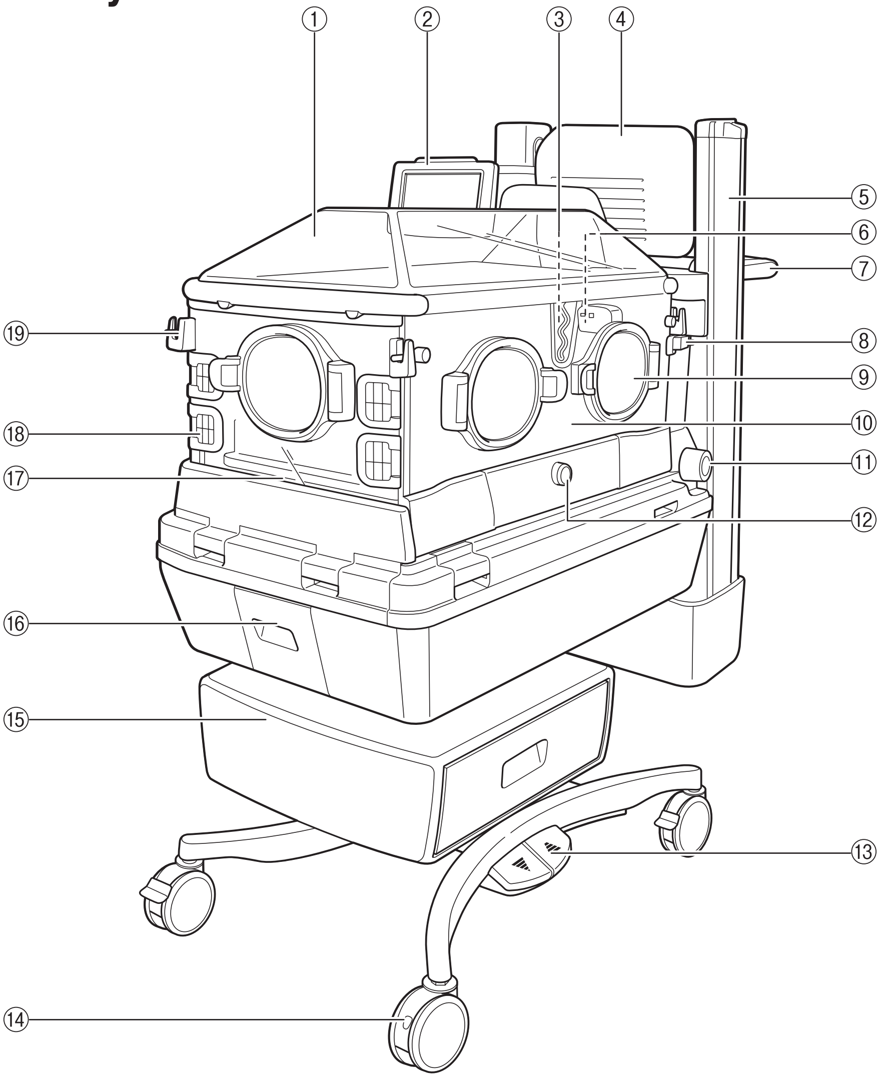
Do not attach any peripheral device that is not specified by Atom to the incubator.

Check the operation of the peripheral devices.
If a device transmitting or receiving weak signals is installed near the unit, it may be affected by the electromagnetic waves generated by the latter. Check the operation of the peripheral devices for any effect before using the unit in clinical settings. Stop using the unit immediately if any trouble is detected.

When relocating the unit, watch your step so that you do not have your feet run over by a caster.

[2] Parts Identification

2-1. Main body

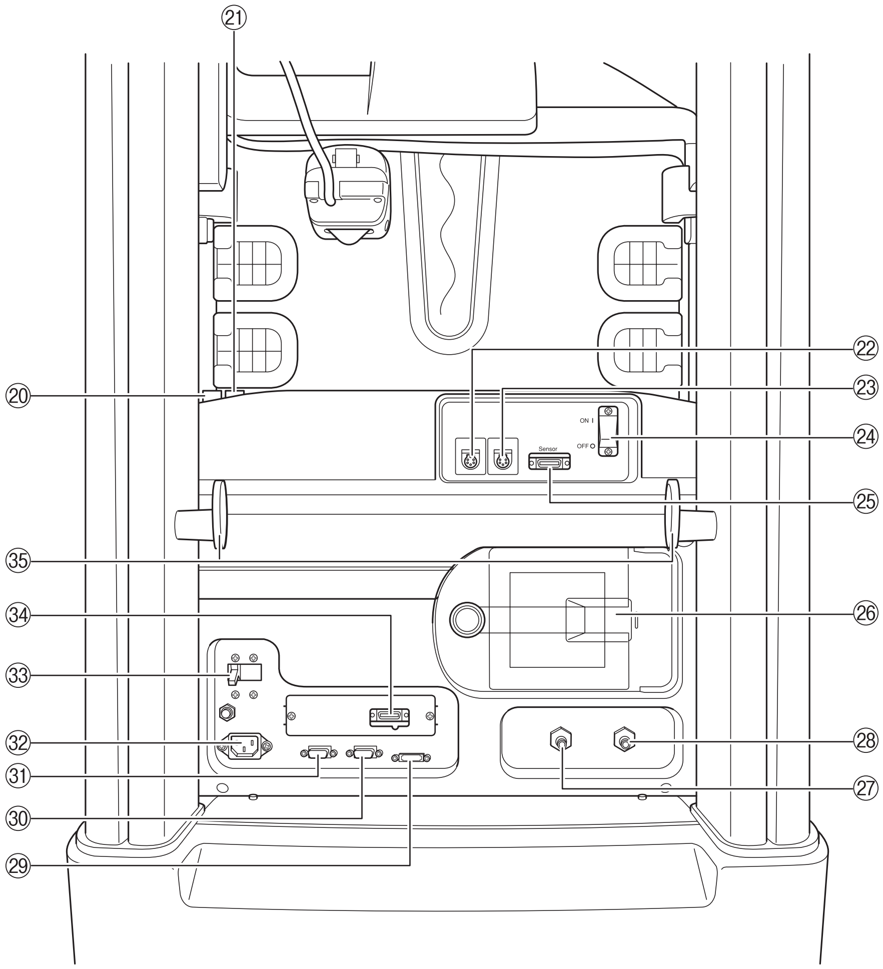


No.	Name
①	Canopy
②	Display
③	Patient circuit slot grommet
④	Radiant warmer
⑤	Dovetail rail
⑥	Sensor module
⑦	Handle
⑧	Admittance panel operating lever
⑨	Snap-open access port
⑩	Admittance panel

No.	Name
⑪	Mattress platform tilting knob
⑫	X-ray cassette tray door locking knob
⑬	Foot switch
⑭	Caster
⑮	Drawer
⑯	Humidity chamber cover
⑰	Mattress
⑱	Tube introduction slit packing
⑲	Admittance panel operating knob

Note: ⑮ Drawer is an available option.

■ Rear

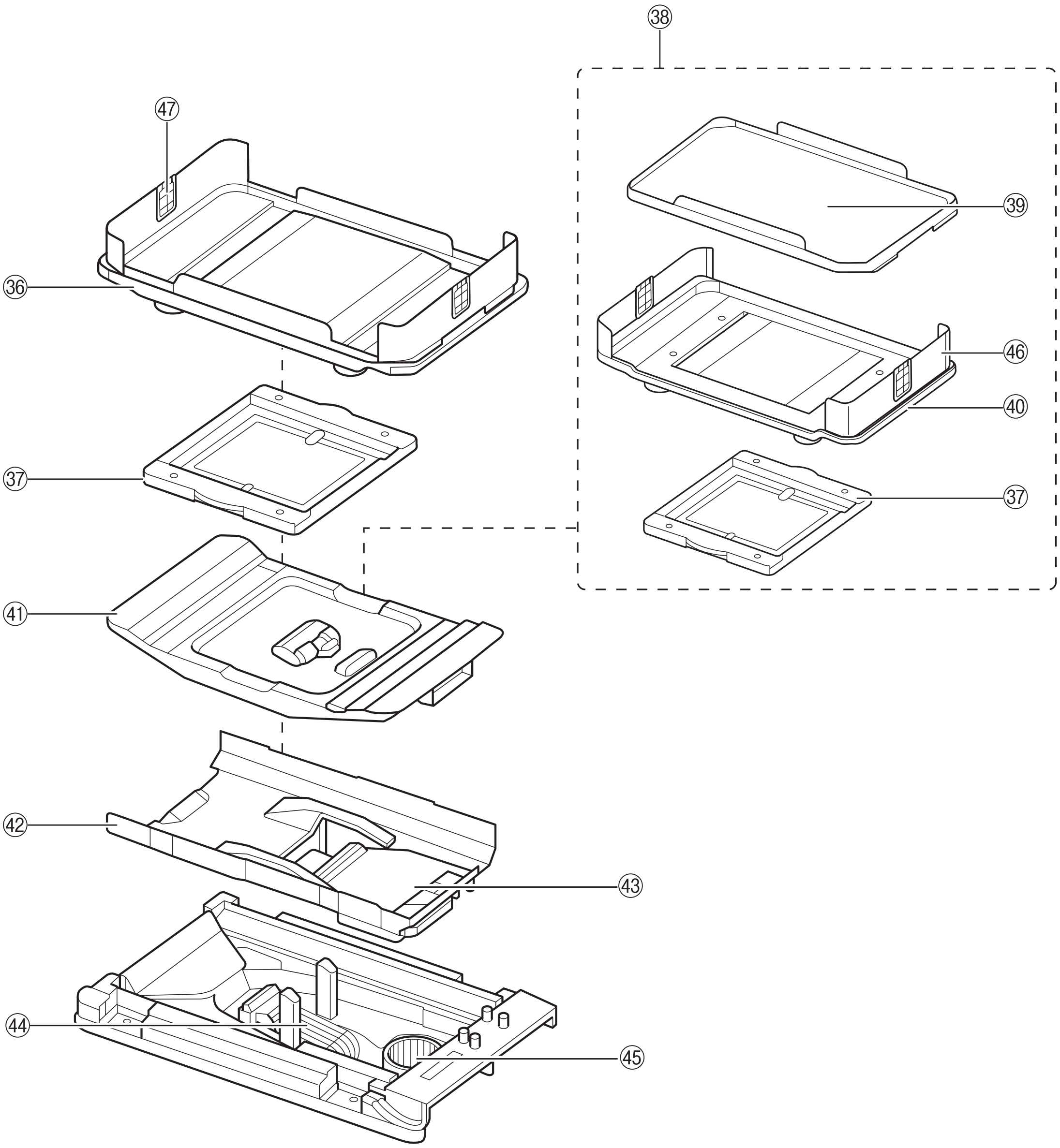


No.	Name
⑳	Incubator mode switch
㉑	Radiant warmer mode switch
㉒	Skin temperature probe connecting port 1
㉓	Skin temperature probe connecting port 2
㉔	Power switch
㉕	Connector for sensor module
㉖	Filter cover
㉗	Oxygen supply port 1

No.	Name
㉘	Oxygen supply port 2
㉙	Connector for weight monitor
㉚	Connector for the display
㉛	Connector for the Power Pack *i* (UPS)
㉜	AC inlet
㉝	Breaker
㉞	Connector for SpO$_2$
㉟	Cord cleat

Note: ㉘ Oxygen supply port 2 is available only on the unit equipped with the oxygen controller.
㉞ Connector for SpO$_2$ is an available option.

■ Inside



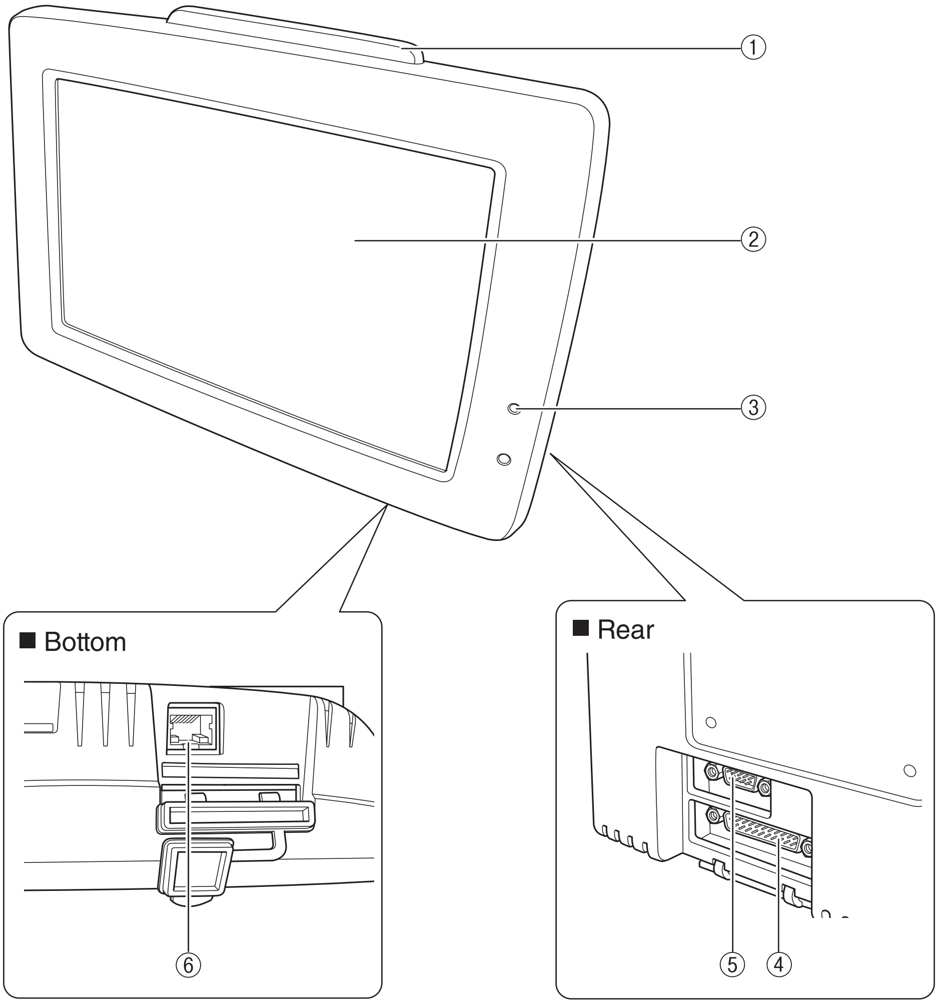
No.	Name
㊱	Mattress platform
㊲	X-ray cassette tray
㊳	Weight monitor unit
㊴	Mattress platform for weight monitor
㊵	Tray for weight monitor
㊶	Mattress platform tray

No.	Name
㊷	Middle board
㊸	Fan cover
㊹	Heater
㊺	Fan
㊻	Baby guard
㊼	Tube introduction slit packing

Note: ㊳ Weight monitor unit is an available option.

2-2. Display

■ Front

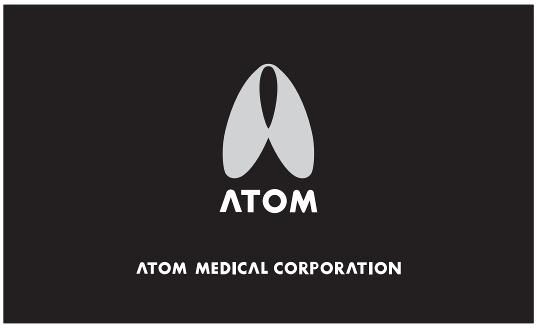


No.	Name
①	Alarm lamp
②	Operation panel
③	Power failure alarm indicator
④	I/O port (External communication connector)
⑤	Connector for the main body
⑥	Communication port (LAN)

2-3. Display Screens

2-3-1. General Description of the Screens

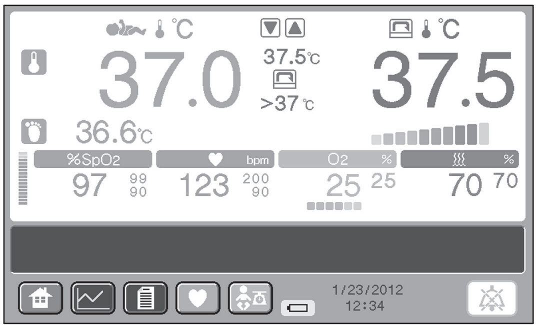
(1) Start screen (This screen is displayed both in the incubator mode and in the radiant warmer mode.)


ATOM
ATOM MEDICAL CORPORATION

The start screen appears when the power is applied. It is automatically switched to the main screen of the incubator mode if the canopy is in a lowered position (the incubator mode); it is automatically switched to the main screen of the radiant warmer mode if the canopy is in a raised position (the radiant warmer mode).

(2) Incubator mode

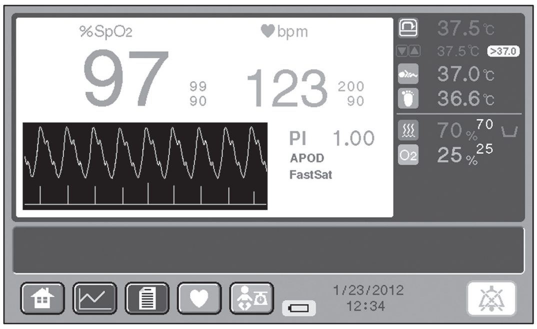
[Main screen]


°C
37.0
37.5°C
>37°C
°C
37.5
36.6°C
%SpO2
97
99
90
bpm
123
200
90
O2 %
25
25
%
70
70
1/23/2012
12:34

This screen appears first when the unit enters the incubator mode.

If any other screen of the incubator mode is being displayed, touch the ⌂ switch, and the main screen will be displayed. This screen displays the set temperature, the incubator air temperature, the skin temperature 1, the skin temperature 2, the relative humidity, the oxygen concentration, SpO2, the pulse rate, etc. in the incubator mode.

[Pulse oximeter screen]

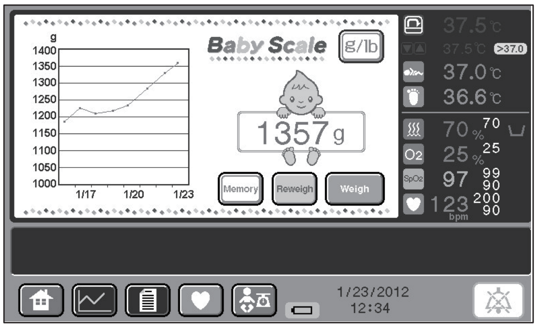

%SpO2
97
99
90
bpm
123
200
90
PI 1.00
APOD
FastSat
37.5°C
37.5°C >37.0
37.0°C
36.6°C
70 % 70
25 % 25
O2
1/23/2012
12:34

Touch the ♥ switch on any other screen of the incubator mode, and the pulse oximeter screen of the incubator mode will be displayed.

This screen highlights SpO2 and the pulse rate in the incubator mode. Pulse waves are also displayed.

In addition, the set temperature, the incubator air temperature, the skin temperature 1, the skin temperature 2, the relative humidity, the oxygen concentration, etc. are displayed.

[Weight screen] (This screen is displayed only when the unit is equipped with the weight monitor unit.)


g
1400
1350
1300
1250
1200
1150
1100
1050
1000
1/17
1/20
1/23
Baby Scale
g/lb
1357 g
Memory
Reweigh
Weigh
37.5°C
37.5°C >37.0
37.0°C
36.6°C
70 % 70
25 % 25
O2
SpO2
97
99
90
123
200
90
bpm
1/23/2012
12:34

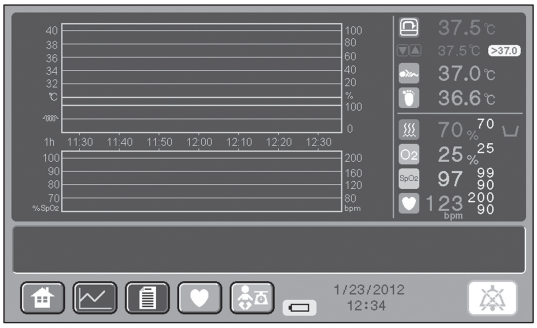
Touch the ⚖ switch on any other screen of the incubator mode, and the weight screen will be displayed.

This screen highlights weight functions such as the weighing procedure in the incubator mode and the weight trend graph.

In addition, the set temperature, the incubator air temperature, the skin temperature 1, the skin temperature 2, the relative humidity, the oxygen concentration, SpO2, the pulse rate, etc. are displayed.

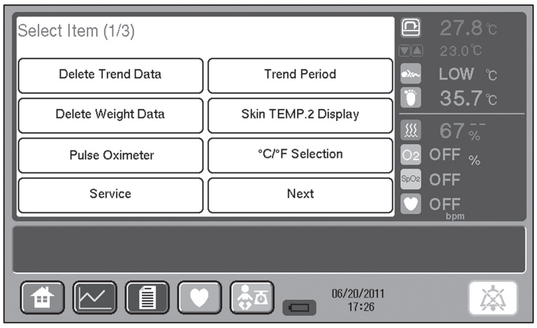
[Trend screen]

Touch the 📈 switch on any other screen of the incubator mode, and the trend screen will be displayed.
This screen displays trend graphs.


40
38
36
34
32
℃
1h 11:30 11:40 11:50 12:00 12:10 12:20 12:30
100
90
80
70
%SpO2
100
80
60
40
20
%
100
0
200
160
120
80
bpm
37.5℃
37.5℃ >37.0
37.0℃
36.6℃
70 % 70
O2 25 % 25
SpO2 97 99 90
123 200 90
bpm
1/23/2012
12:34

[Menu screen]

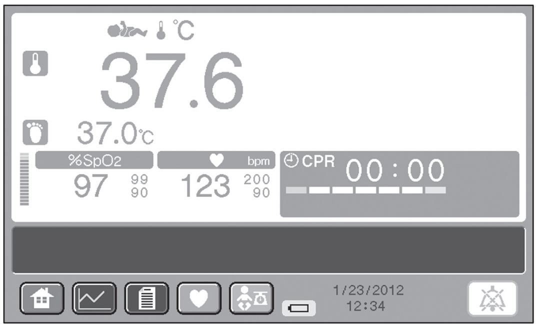
Touch the 📋 switch on any other screen of the incubator mode, and the menu screen for advanced settings of the incubator mode will be displayed.
Use this screen to select advanced settings. In addition, the set temperature, the incubator air temperature, the skin temperature 1, the skin temperature 2, the relative humidity, the oxygen concentration, SpO2, the pulse rate, etc. in the incubator mode are displayed.
When this screen is displayed, you can only select advanced settings of each menu item or switch the screen to another.


Select Item (1/3)

Delete Trend Data
Trend Period
Delete Weight Data
Skin TEMP.2 Display
Pulse Oximeter
°C/°F Selection
Service
Next
27.8℃
23.0℃
LOW ℃
35.7℃
67 %
O2 OFF %
SpO2 OFF
OFF
bpm
06/20/2011
17:26

(3) Transition mode screen

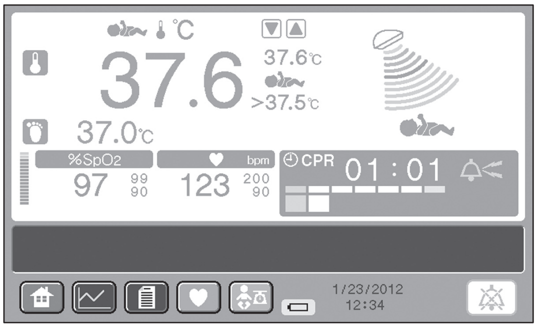
This screen appears during transition from the incubator mode to the radiant warmer mode and vice versa.
This screen displays such vital signs as the skin temperature 1, the skin temperature 2, SpO2, and the pulse rate.
If the transition should be interrupted in emergency, a message will appear on the screen. The mode cannot be switched on this screen.


℃
37.6
37.0℃
%SpO2
97 99 90
bpm
123 200 90
CPR 00 : 00
1/23/2012
12:34

(4) Radiant warmer mode

[Main screen]

This screen appears first when the unit enters the radiant warmer mode.
If any other screen of the radiant warmer mode is being displayed, touch the 🏠 switch, and the main screen will be displayed.
This screen displays the heater setting, the heater output, the skin temperature 1, the skin temperature 2, SpO2, the pulse rate, the timer, etc. in the radiant warmer mode.

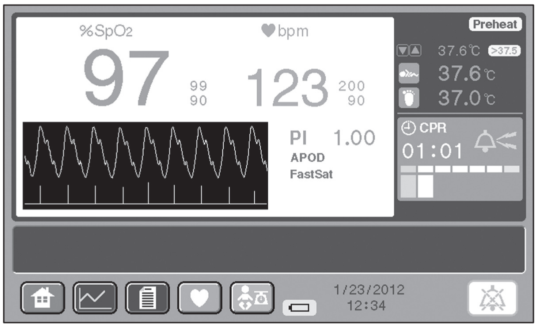

℃
37.6
37.6℃
>37.5℃
37.0℃
%SpO2
97 99 90
bpm
123 200 90
CPR 01 : 01
1/23/2012
12:34

[Pulse oximeter screen]

Touch the ♥ switch on any other screen of the radiant warmer mode, and the pulse oximeter screen will be displayed.

This screen highlights the timer, SpO2, and the pulse rate in the radiant warmer mode. Pulse waves are also displayed.

In addition, the heater setting, the heater output, the skin temperature 1, the skin temperature 2, etc. are displayed.

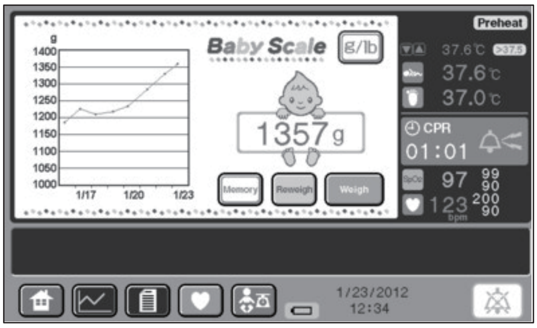

%SpO2
97
99
90
♥bpm
123
200
90
PI 1.00
APOD
FastSat
Preheat
37.6℃ >37.5
37.6℃
37.0℃
CPR
01:01
1/23/2012
12:34

[Weight screen] (This screen is displayed only when the unit is equipped with the weight monitor unit.)

Touch the ⚖ switch on any other screen of the radiant warmer mode, and the weight screen of the radiant warmer mode will be displayed.

This screen highlights weight functions such as the weighing procedure in the radiant warmer mode and the weight trend graph.

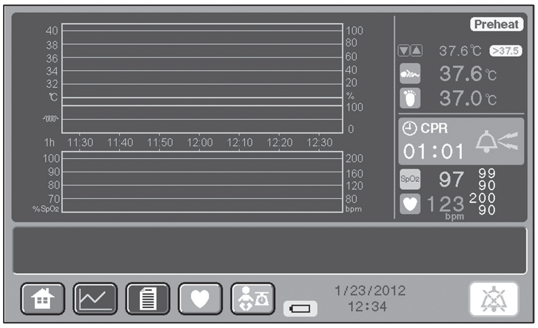
In addition, the heater setting, the skin temperature 1, the skin temperature 2, SpO2, the pulse rate, the timer, etc. are displayed.


g
1400
1350
1300
1250
1200
1150
1100
1050
1000
1/17
1/20
1/23
Baby Scale
g/lb
1357 g
Memory
Reweigh
Weigh
Preheat
37.6℃ >37.5
37.6℃
37.0℃
CPR
01:01
97 99 90
123 200 90
bpm
1/23/2012
12:34

[Trend screen]

Touch the 📈 switch on any other screen of the radiant warmer mode, and the trend screen will be displayed.

This screen displays trend graphs.

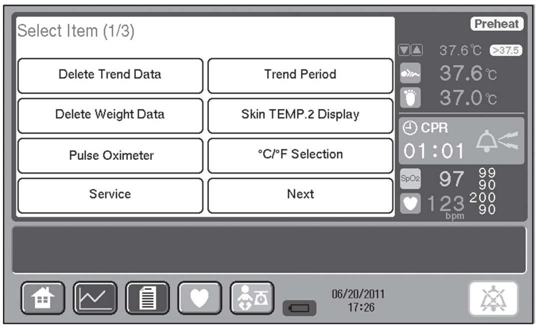

40
38
36
34
32
℃
1h
11:30
11:40
11:50
12:00
12:10
12:20
12:30
100
80
60
40
20
%
100
0
100
90
80
70
%SpO2
200
160
120
80
bpm
Preheat
37.6℃ >37.5
37.6℃
37.0℃
CPR
01:01
97 99 90
123 200 90
bpm
1/23/2012
12:34

[Menu screen]

Touch the 📋 switch on any other screen of the radiant warmer mode, and the menu screen for advanced settings of the radiant warmer mode will be displayed.

Use this screen to select advanced settings. In addition, the set temperature, the skin temperature 1, the skin temperature 2, SpO2, the pulse rate, etc. in the radiant warmer mode are displayed.

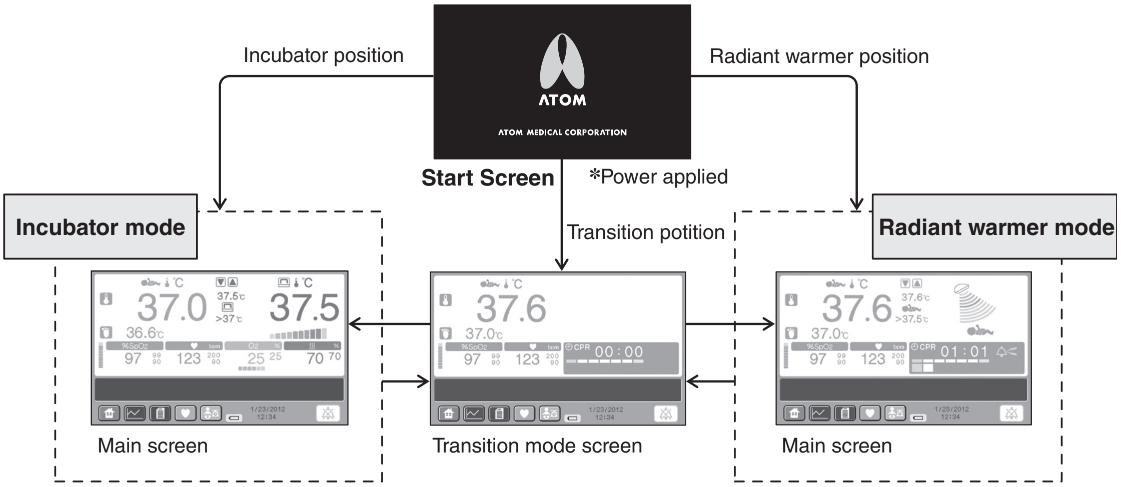
When this screen is displayed, you can only select advanced settings of each menu item or switch the screen to another.


Select Item (1/3)
Delete Trend Data
Trend Period
Delete Weight Data
Skin TEMP.2 Display
Pulse Oximeter
°C/°F Selection
Service
Next
Preheat
37.6℃ >37.5
37.6℃
37.0℃
CPR
01:01
97 99 90
123 200 90
bpm
06/20/2011
17:26

2-3-2. Screen Transition Diagram

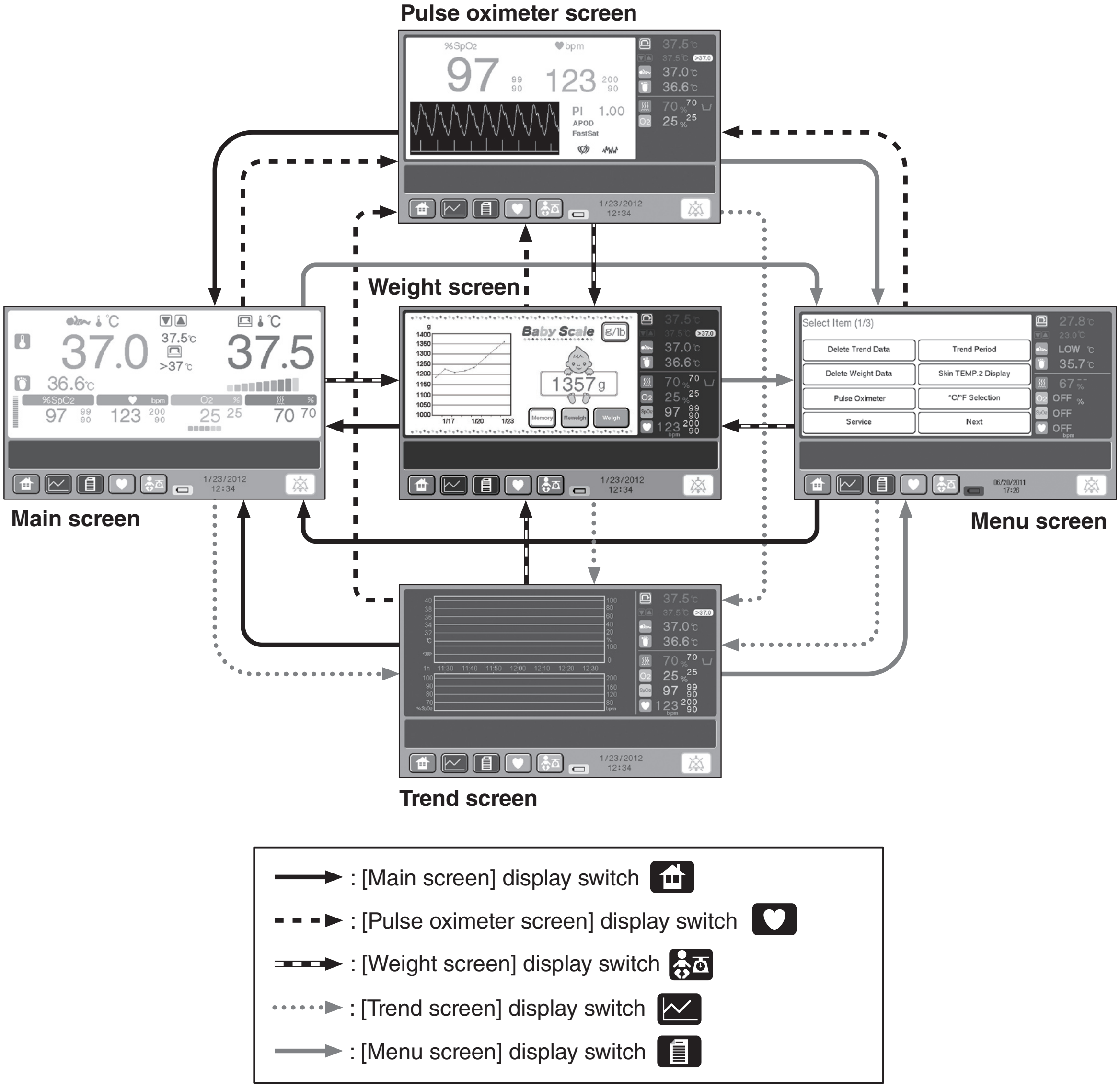
(1) Transition diagram between the two operation modes

The start screen is automatically switched to the main screen of the incubator mode if the canopy is in a lowered position (the incubator mode); it is automatically switched to the main screen of the radiant warmer mode if the canopy is in a raised position (the radiant warmer mode).


Incubator position
Radiant warmer position
ATOM
ATOM MEDICAL CORPORATION
Start Screen
*Power applied
Transition potition
Incubator mode
Radiant warmer mode
Main screen
Transition mode screen
Main screen

(2) Transition diagram in each operation mode

✻ The screens to be displayed in the incubator mode are shown below. The same transition diagram applies to the radiant warmer mode.


Pulse oximeter screen
Weight screen
Main screen
Menu screen
Trend screen
Baby Scale
1357 g
Select Item (1/3)
Delete Trend Data
Trend Period
Delete Weight Data
Skin TEMP.2 Display
Pulse Oximeter
°C/°F Selection
Service
Next
: [Main screen] display switch
: [Pulse oximeter screen] display switch
: [Weight screen] display switch
: [Trend screen] display switch
: [Menu screen] display switch

2-3-3. List of Operations Available on Each Screen

Table 1. List of Setting Operations Available on Each Screen

Upper: Incubator mode Lower: Radiant warmer mode

Setting (measuring) Operation	**Trend screen** *2	**Main screen**	**Menu screen**	**Pulse oximeter screen**	**Weight screen** *1
Temperature-related operation (manual/servo)	○	○	×	○	○
	○	○	×	○	○
Setting humidity	○	○	×	○	○
	–	–	–	–	–
Setting oxygen control	○	○	×	○	○
	–	–	–	–	–
Setting SpO_2/pulse rate upper/lower alarm limits	○	○	×	○	○
	○	○	×	○	○
Weighing the infant *1	×	×	×	×	○
	×	×	×	×	○
Timer *2	–	–	–	–	–
	○	○	×	○	○
Selecting other advanced settings	×	×	○	×	×
	×	×	○	×	×

○ : Setting (measuring) operation available

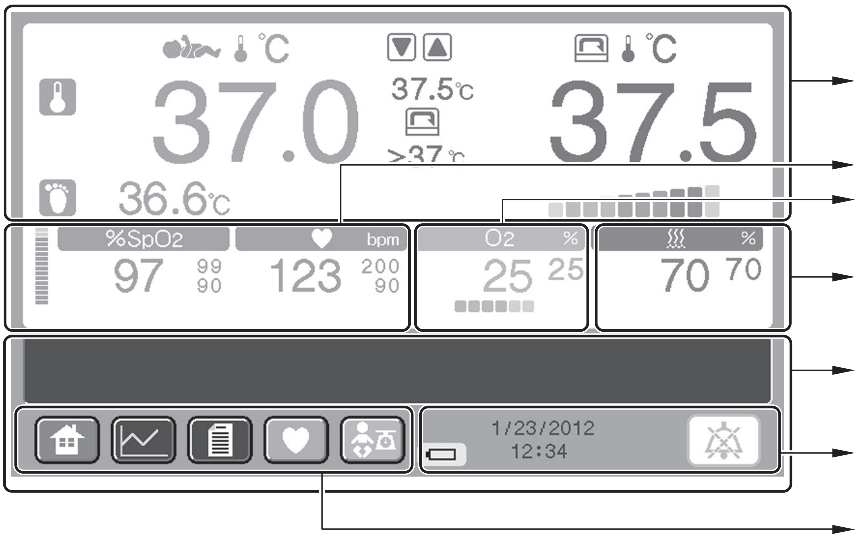
× : Setting operation not available

– : The function not provided

*1: Optional function *2: Types selectable on the menu screen

2-3-4. Main screen

- Incubator mode


℃
37.0
37.5℃
>37℃
36.6℃
℃
37.5
%SpO2
97
99
90
bpm
123
200
90
O2
%
25
25
%
70
70
1/23/2012
12:34

Temperature area (See p.24)

Pulse area (See p.25)

Oxygen area (See p.24)

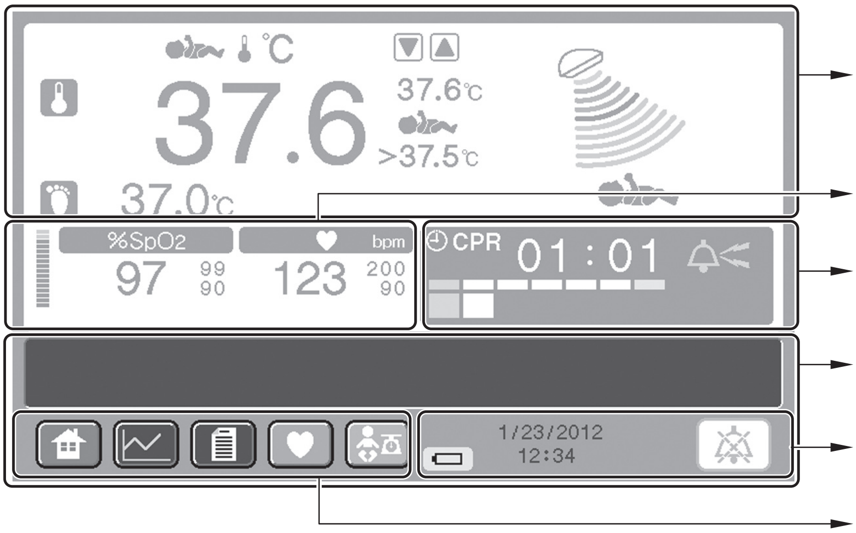
Relative humidity area (See p.24)

Message area (See p.26)

Clock and other indicators area (See p.26)

Screen display switch area (See p.25)

- Radiant warmer mode


℃
37.6
37.6℃
>37.5℃
37.0℃
%SpO2
97
99
90
bpm
123
200
90
CPR
01 : 01
1/23/2012
12:34

Heat area (See p.26)

Pulse area (See p.25)

Timer area (See p.27)

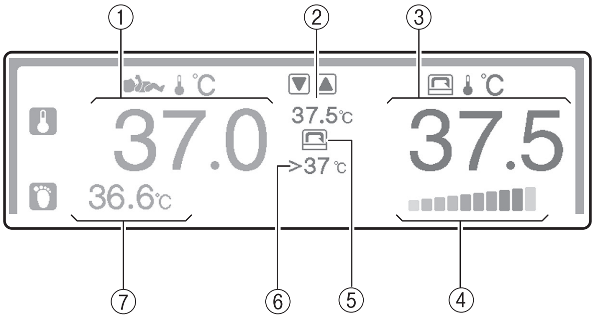
Message area (See p.26)

Clock and other indicators area (See p.26)

Screen display switch area (See p.25)

[Temperature area] (Incubator mode)

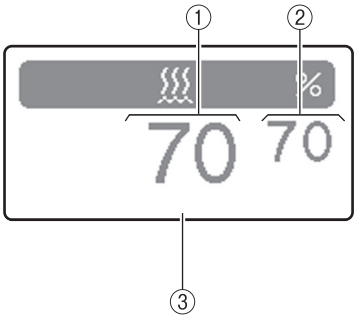
✻ Touch this area to start the temperature-related setting operation.



No.	Name	Description
①	Skin temperature 1 display	Displays a detected skin temperature 1 digitally.
②	Set temperature display	Displays a set incubator air temperature in manual control. Displays a set skin temperature 1 in servo control.
③	Incubator air temperature display	Displays a detected incubator air temperature digitally.
④	Heater output indicator	Indicates the heat supply in 10 levels.
⑤	Mode indicator	▭ comes on in manual control and 👶 comes on in servo control.
⑥	Override indicator	>37℃ (in manual control) or >37.5℃ (in servo control) comes on in the override mode.
⑦	Skin temperature 2 display	Displays a detected skin temperature 2 or △T (detected skin temperature 1–detected skin temperature 2) digitally.

[Relative humidity area] (Incubator mode)

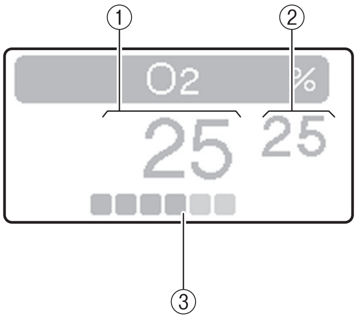
✻ Touch this area to start the relative humidity-related setting operation.



No.	Name	Description
①	Relative humidity display	Displays a detected relative humidity in the incubator digitally.
②	Set relative humidity display	Displays a set relative humidity digitally.
③	Water level indicator	Indicates the level of water in the humidity chamber or the state of the humidity chamber.

[Oxygen area] (Incubator mode)

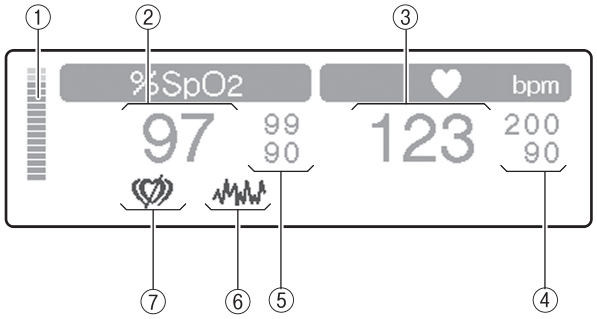
✻ Touch this area to start the oxygen-related setting operation.



No.	Name	Description
①	Oxygen concentration display	Displays a detected oxygen concentration in the incubator digitally.
②	Set oxygen concentration display	Displays a set oxygen concentration digitally.
③	Oxygen flow rate indicator	Indicates a detected oxygen flow rate in 6 levels.

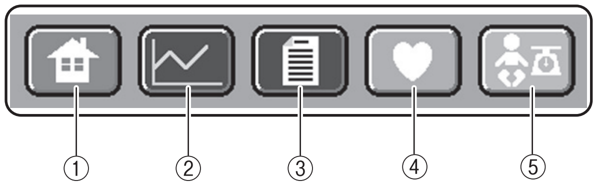
[Pulse area]

✻ Touch this area to start the pulse oximeter-related setting operation.



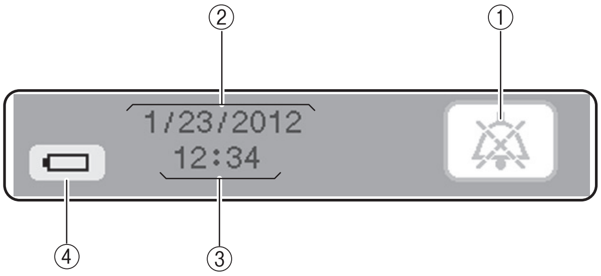
No.	Name	Description
①	Plethysmograph bar	Indicates changes in the arterial flow.
②	%SpO_2 display	Displays a detected SpO_2 value digitally.
③	Pulse rate display	Displays a detected pulse rate digitally.
④	Pulse rate alarm limits display	Displays a pulse rate upper alarm limit above and a pulse rate lower alarm limit below digitally.
⑤	SpO_2 alarm limits display	Displays an SpO_2 upper alarm limit above and an SpO_2 lower alarm limit below digitally.
⑥	Interference indicator (Nellcor only)	Comes on when interference is detected.
⑦	Pulse search indicator (Nellcor only)	Comes on when no pulse is detected.

[Screen display switch area]



No.	Name	Description
①	Main screen display switch	Touch this switch to have the main screen displayed.
②	Trend screen display switch	Touch this switch to have the trend screen displayed.
③	Menu screen display switch	Touch this switch to have the menu screen displayed.
④	Pulse oximeter screen display switch	Touch this switch to have the pulse oximeter screen displayed.
⑤	Weight screen display switch	Touch this switch to have the weight screen displayed.

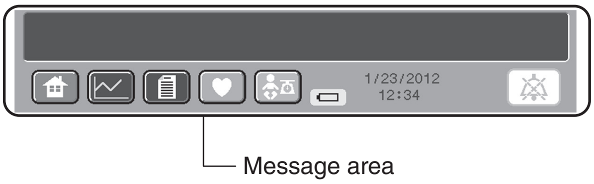
[Clock and other indicators area]



No.	Name	Description
①	Alarm silence switch	Touch this switch to silence an active audible alarm temporarily or reset an alarm condition.
②	Date display	Displays a date in the month/day/year format.
③	Time display	Displays a time in the hour:minute format.
④	Battery indicator	Comes on only when the internal battery (Power Pack *i* : option) is used.

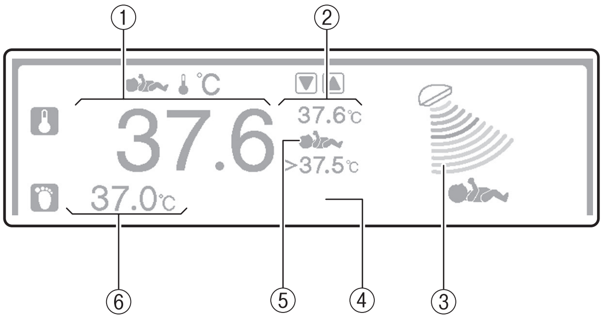
[Message area]

✻ Messages other than those related to operations are displayed in this area.



[Heat area] (Radiant warmer mode)

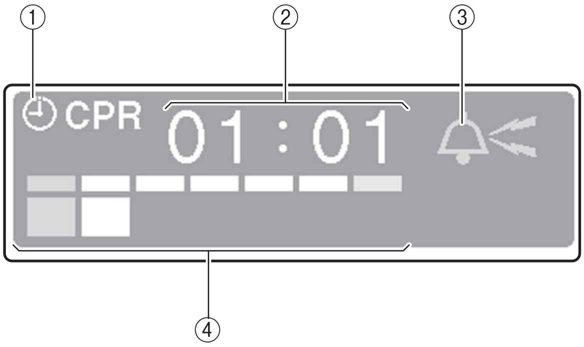
✻ Touch this area to start the heater output-related setting operation.



No.	Name	Description
①	Skin temperature 1 display	Displays a detected skin temperature 1 digitally.
②	Set heat display	Displays a set heater output in manual control. Displays a set skin temperature 1 in servo control.
③	Heater output indicator	Indicates the heat supply in 10 levels.
④	Override indicator	>37.5℃ comes on in the override mode.
⑤	Mode indicator	comes on in manual control and comes on in servo control.
⑥	Skin temperature 2 display	Displays a detected skin temperature 2 or △T (detected skin temperature 1 –detected skin temperature 2) digitally.

[Timer area] (Radiant warmer mode)

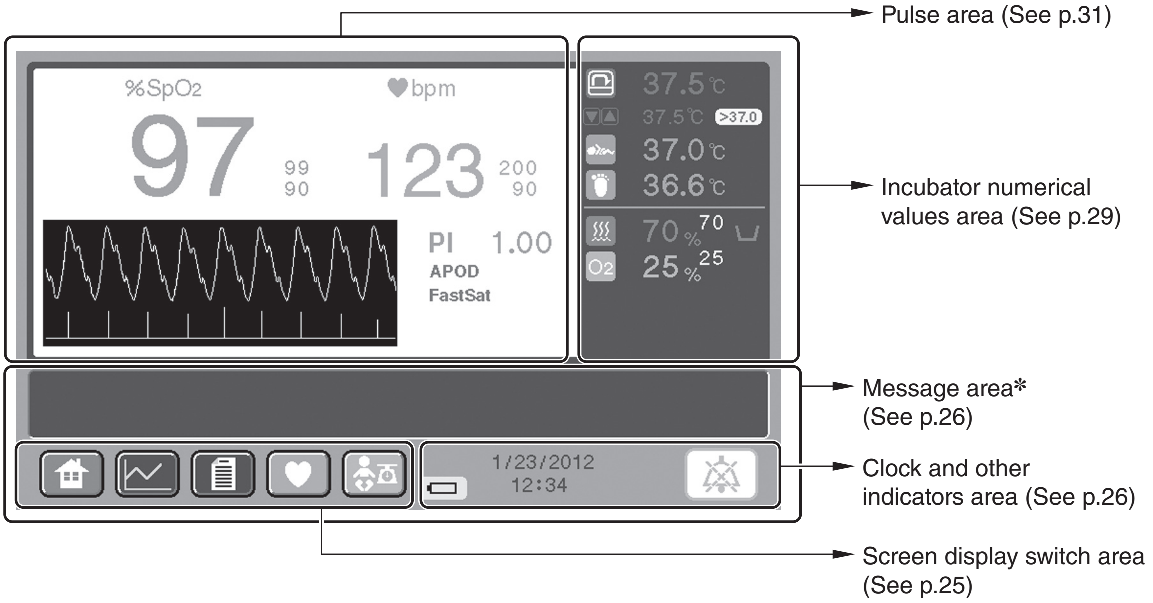
✻ Touch this area to activate the timer.



No.	Name	Description
①	Timer type indicator	Indicates the timer type currently selected.
②	Timer display	Displays how much time has elapsed digitally in the minute:second format.
③	Bell indicator	A bell appears when a chime rings.
④	Second counter	Activates every 30 seconds only in the CPR timer mode. Comes on segment by segment as each second passes.

2-3-5. Pulse Oximeter Screen

- Incubator mode


%SpO2
bpm
97
99
90
123
200
90
PI 1.00
APOD
FastSat
37.5℃
37.5℃ >37.0
37.0℃
36.6℃
70 % 70
25 % 25
O2
1/23/2012
12:34

Pulse area (See p.31)

Incubator numerical values area (See p.29)

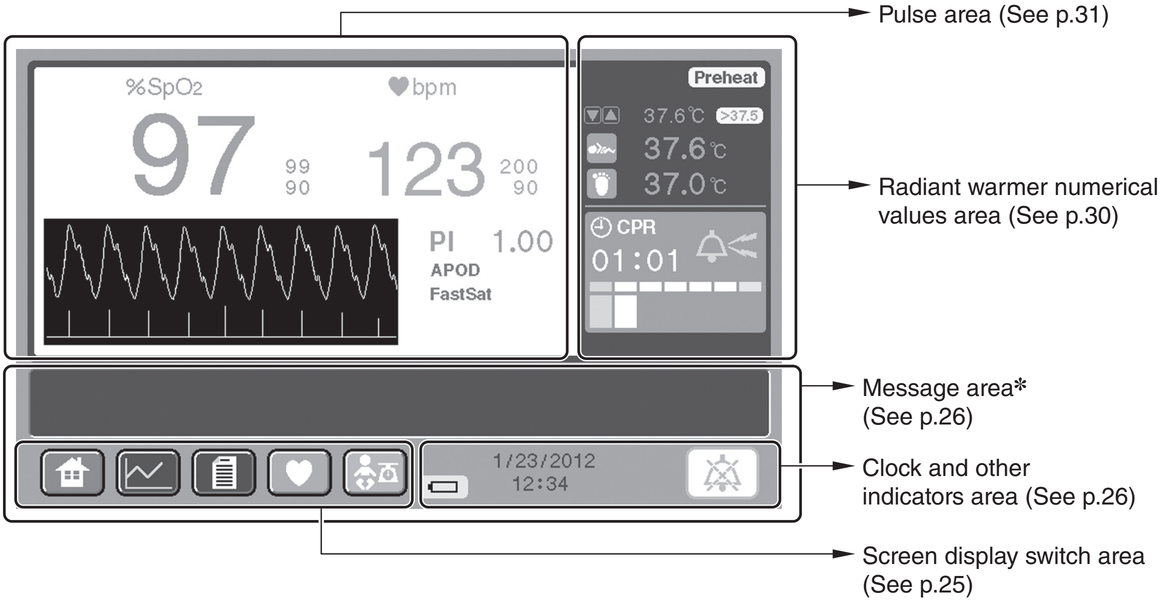
Message area* (See p.26)

Clock and other indicators area (See p.26)

Screen display switch area (See p.25)

✻ The pulse area shown in the figure above is for a Masimo pulse oximeter.

- Radiant warmer mode


%SpO2
bpm
97
99
90
123
200
90
PI 1.00
APOD
FastSat
Preheat
37.6℃ >37.5
37.6℃
37.0℃
CPR
01:01
1/23/2012
12:34

Pulse area (See p.31)

Radiant warmer numerical values area (See p.30)

Message area* (See p.26)

Clock and other indicators area (See p.26)

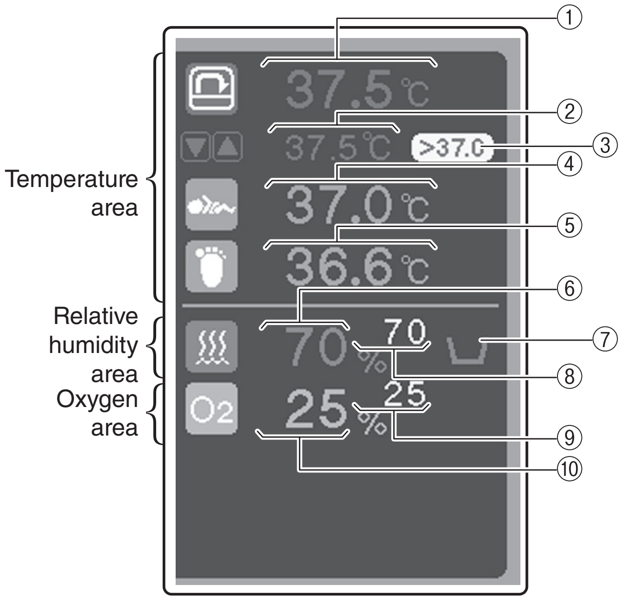
Screen display switch area (See p.25)

✻ The pulse area shown in the figure above is for a Masimo pulse oximeter.

✻ The screen display switch area, the clock and other indicators area, and the message area are the same as those of the main screen (“2-3-4. Main Screen”). (Therefore there is no reference to them below.)

[Incubator numerical values area]

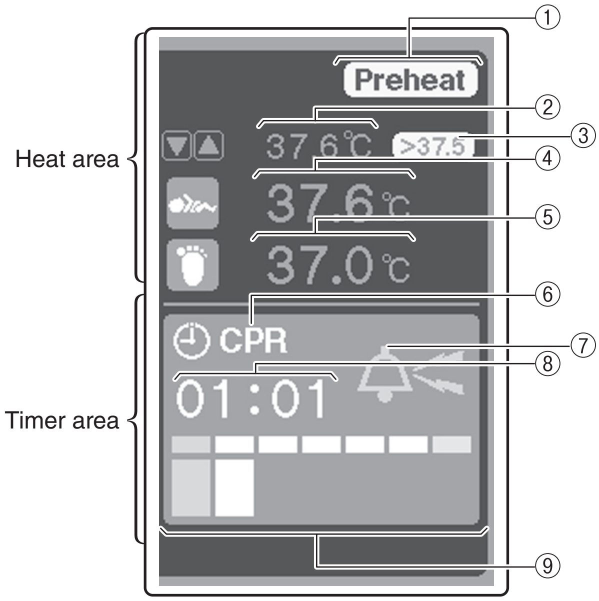
✻ Touch an appropriate area (the temperature area, the relative humidity area, or the oxygen area) to start the area-related setting operation. (You can follow the same procedure as on the main screen.)



No.	Name	Description
①	Incubator air temperature display	Displays a detected incubator air temperature digitally.
②	Set temperature display	Displays a set incubator air temperature in manual control (in the same color as the detected incubator air temperature). Displays a set skin temperature 1 in servo control (in the same color as the detected skin temperature 1).
③	Override indicator	Comes on in the override mode.
④	Skin temperature 1 display	Displays a detected skin temperature 1 digitally.
⑤	Skin temperature 2 display	Displays a detected skin temperature 2 or △T (detected skin temperature 1 –detected skin temperature 2) digitally.
⑥	Relative humidity display	Displays a detected relative humidity in the incubator digitally.
⑦	Water level indicator	Indicates the level of water in the humidity chamber or the state of the humidity chamber.
⑧	Set relative humidity display	Displays a set relative humidity digitally.
⑨	Set oxygen concentration display	Displays a set oxygen concentration digitally.
⑩	Oxygen concentration display	Displays a detected oxygen concentration in the incubator digitally.

[Radiant warmer numerical values area]

✻ Touch an appropriate area (the heat area or the timer area) to start the area-related setting operation. (You can follow the same procedure as on the main screen.)

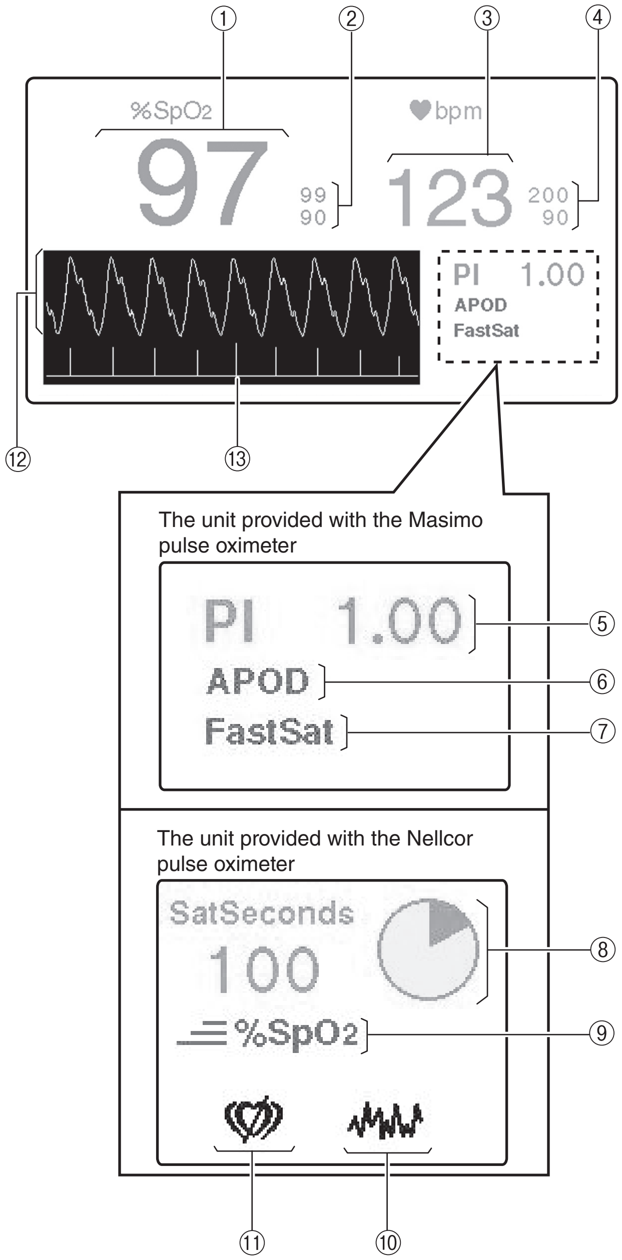


No.	Name	Description
①	Preheat indicator	Comes on in the preheat mode.
②	Set heat display	Displays a set heater output in manual control (in the same color as the heater output). Displays a set skin temperature 1 in servo control (in the same color as the detected skin temperature 1).
③	Override indicator	>37.5℃ comes on in the servo control override mode.
④	Skin temperature 1 display	Displays a detected skin temperature 1 digitally.
⑤	Skin temperature 2 display	Displays a detected skin temperature 2 or △T (detected skin temperature 1 –detected skin temperature 2) digitally.
⑥	Timer type indicator	Indicates the timer type currently selected.
⑦	Bell indicator	A bell appears when a chime rings.
⑧	Timer display	Displays how much time has elapsed digitally in the minute:second format.
⑨	Second counter	Activates every 30 seconds only in the CPR timer mode. Comes on segment by segment as each second passes.

[Pulse area]

✻ The pulse area is the same in the incubator mode and in the radiant warmer mode.

✻ Touch this area to start the pulse oximeter-related setting operation.


①
②
③
④
%SpO2
97
99
90
♥bpm
123
200
90
PI 1.00
APOD
FastSat
⑫
⑬
The unit provided with the Masimo pulse oximeter
PI 1.00
APOD
FastSat
⑤
⑥
⑦
The unit provided with the Nellcor pulse oximeter
SatSeconds
100
%SpO2
⑧
⑨
⑪
⑩

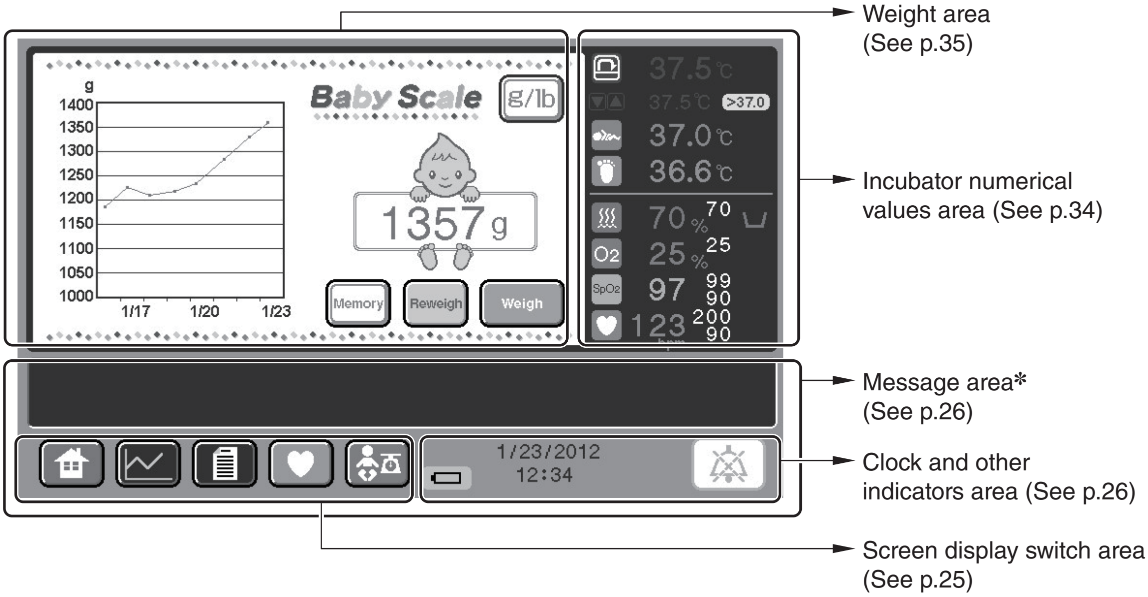
No.	Name	Description
①	%SpO2 display	Displays a detected SpO2 value digitally.
②	SpO2 alarm limits display	Displays an SpO2 upper alarm limit above and an SpO2 lower alarm limit below digitally.
③	Pulse rate display	Displays a detected pulse rate digitally.
④	Pulse rate alarm limits display	Displays a pulse rate upper alarm limit above and a pulse rate lower alarm limit below digitally.
⑤	PI display	Displays the perfusion index.
⑥	Set sensitivity indicator	Indicates the currently selected sensitivity (Max, Normal, APOD).
⑦	FastSat indicator	Comes on when the FastSat mode is ON
⑧	SatSeconds display (Nellcor only)	The numerical value on the left is the SatSeconds setting. The circular indicator on the right changes color little by little clockwise each time a detected SpO2 is found to be above the SpO2 upper alarm limit or below the SpO2 lower alarm limit. When the whole indicator has changed color, either the SpO2 upper limit alarm or the SpO2 lower limit alarm will occur appropriately. The discolored area will decrease little by little counterclockwise each time a detected SpO2 is found to be within the acceptable range.*1
⑨	Fast response mode indicator (Nellcor only)	Indicates that the response mode is set to “Fast.” This indicator will disappear when the response mode is switched to “Normal.”
⑩	Interference indicator (Nellcor only)	Comes on when interference is detected.
⑪	Pulse search indicator (Nellcor only)	Comes on when no pulse is detected.
⑫	Pulse waves display	Displays pulse waves.
⑬	SIQ display (Masimo only)	Displays the Signal IQ (SIQ) bar graph. The height of each bar is in proportion to the quality of the input signal concerned. The more reliable a measured value is, the higher the bar becomes. The less reliable a measured value is, the lower the bar becomes.

✻1 The higher the SatSeconds limit is set, the longer it takes for the upper or lower limit alarm to occur. Set the SatSeconds limit appropriately by taking into consideration the patient's condition. For example, select a higher setting for monitoring an active patient whose %SpO_2 values tend to fluctuate greatly.
The upper or lower limit alarm will occur even when the whole indicator has not changed color if a detected %SpO_2 value deviates from the acceptable range three or more times within 60 seconds.

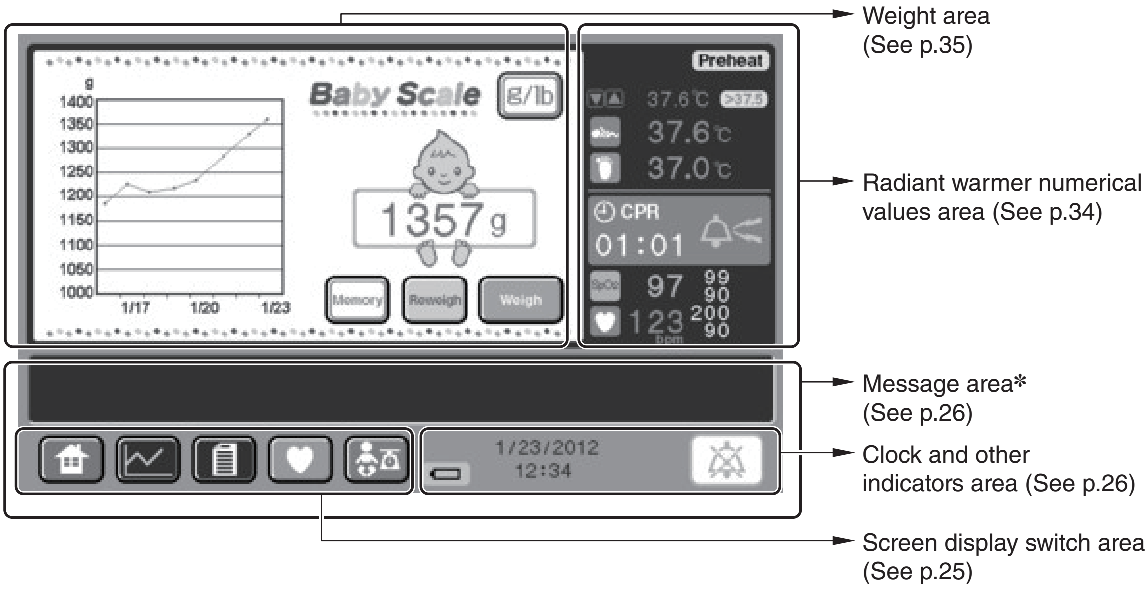
2-3-6. Weight Screen

✻ The weight screen is displayed only when the unit is equipped with the weight monitor unit.

- Incubator mode


Weight area
(See p.35)
Incubator numerical values area (See p.34)
Message area✻
(See p.26)
Clock and other indicators area (See p.26)
Screen display switch area
(See p.25)
Baby Scale
g/lb
1357 g
Memory
Reweigh
Weigh
g
1400
1350
1300
1250
1200
1150
1100
1050
1000
1/17
1/20
1/23
37.5℃
37.5℃ >37.0
37.0℃
36.6℃
70 % 70
25 % 25
O2
SpO2
97 99 90
123 200 90
1/23/2012
12:34

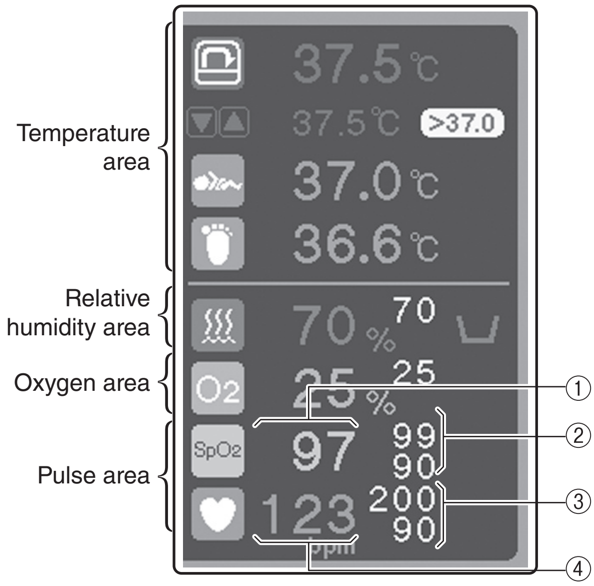
- Radiant warmer mode


Weight area
(See p.35)
Radiant warmer numerical values area (See p.34)
Message area✻
(See p.26)
Clock and other indicators area (See p.26)
Screen display switch area
(See p.25)
Baby Scale
g/lb
1357 g
Memory
Reweigh
Weigh
g
1400
1350
1300
1250
1200
1150
1100
1050
1000
1/17
1/20
1/23
Preheat
37.6℃ >37.5
37.6℃
37.0℃
CPR
01:01
SpO2
97 99 90
123 200 90
bpm
1/23/2012
12:34

✻ The screen display switch area, the clock and other indicators area, and the message area are the same as those of the main screen (“2-3-4. Main Screen”). (Therefore there is no reference to them below.)

[Incubator numerical values area] (Incubator mode)

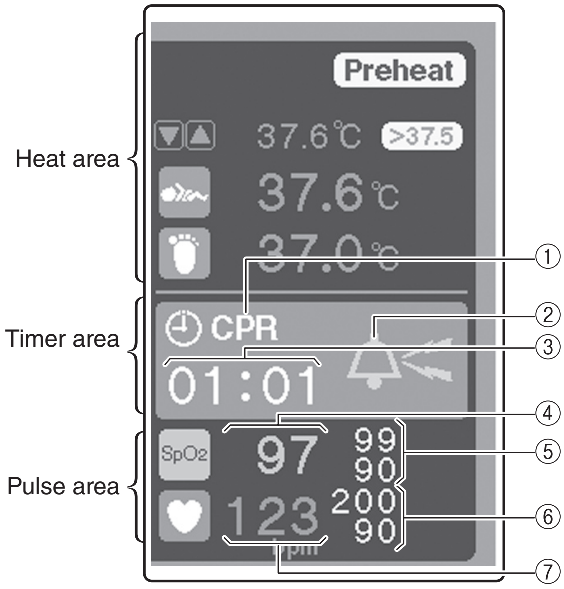
- ✻ The temperature area, the relative humidity area, and the oxygen area are the same as those of the pulse oximeter screen. You can follow the same procedure as on the pulse oximeter screen.
- ✻ Touch the pulse area to start the pulse-related setting operation.


Temperature area
Relative humidity area
Oxygen area
Pulse area
37.5℃
37.5℃
>37.0
37.0℃
36.6℃
70 %
70
O2
25 %
25
SpO2
97
99
90
123
200
90
bpm
①
②
③
④

No.	Name	Description
①	%SpO2 display	Displays a detected SpO2 value digitally.
②	SpO2 alarm limits display	Displays an SpO2 upper alarm limit above and an SpO2 lower alarm limit below digitally.
③	Pulse rate alarm limits display	Displays a pulse rate upper alarm limit above and a pulse rate lower alarm limit below digitally.
④	Pulse rate display	Displays a detected pulse rate digitally.

[Radiant warmer numerical values area] (Radiant warmer mode)

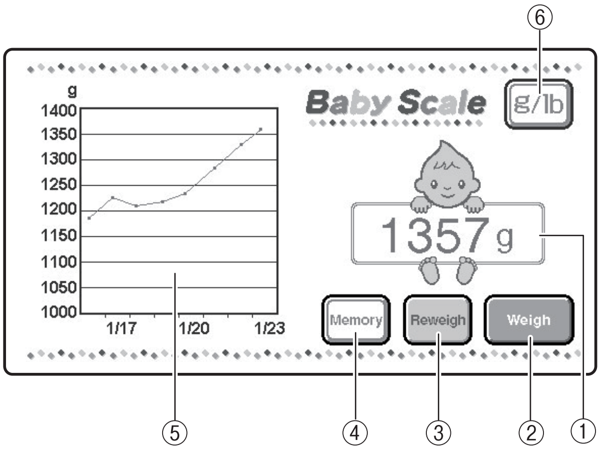
- ✻ The heat area is the same as that of the pulse oximeter screen.
- ✻ The timer area is the same as that of the pulse oximeter screen except that the second counter is excluded.
- ✻ The pulse area is the same as that of the incubator numerical values area.


Heat area
Timer area
Pulse area
Preheat
37.6℃
>37.5
37.6℃
37.0℃
CPR
01:01
SpO2
97
99
90
123
200
90
bpm
①
②
③
④
⑤
⑥
⑦

No.	Name	Description
①	Timer type indicator	Displays the timer type currently selected.
②	Bell indicator	A bell appears when a chime rings.
③	Timer display	Displays how much time has elapsed digitally in the minute:second format.
④	%SpO2 display	Displays a detected SpO2 value digitally.
⑤	SpO2 alarm limits display	Displays an SpO2 upper alarm limit above and an SpO2 lower alarm limit below digitally.
⑥	Pulse rate alarm limits display	Displays a pulse rate upper alarm limit above and a pulse rate lower alarm limit below digitally.
⑦	Pulse rate display	Displays a detected pulse rate digitally.

[Weight area]

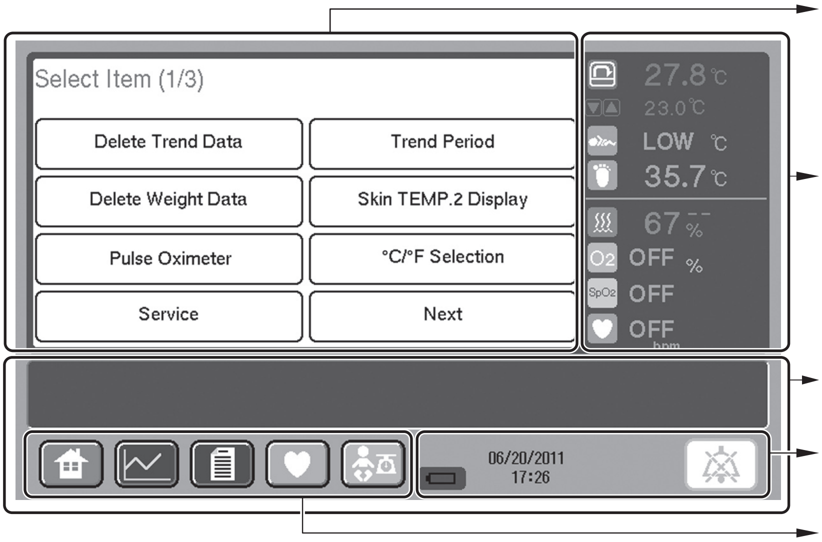
The weight area is the same in the incubator mode and in the radiant warmer mode.


⑥
g
1400
1350
1300
1250
1200
1150
1100
1050
1000
1/17
1/20
1/23
Baby Scale
g/lb
1357 g
Memory
Reweigh
Weigh
⑤
④
③
②
①

No.	Name	Description
①	Weight display area	Displays a message related to weighing when weighing is in progress. Displays a weight reading of the infant when weighing is not in progress.
②	Weigh switch	Touch this switch to start weighing the infant automatically.
③	Reweigh switch	This switch appears only when a tare weight is established. Touch this switch to weigh the infant without performing the tare deduction process.
④	Memory switch	Touch this switch to record the weight reading.
⑤	Weight trend area	Displays a weight trend graph. Touch the trend graph area to have a list of weight readings displayed.
⑥	g/lb selector switch	Touch this switch to switch the unit of weight from gram to pound and ounce, and vice versa.

2-3-7. Menu Screen

- Incubator mode


Select Item (1/3)
Delete Trend Data
Trend Period
Delete Weight Data
Skin TEMP.2 Display
Pulse Oximeter
°C/°F Selection
Service
Next
27.8℃
23.0℃
LOW ℃
35.7℃
67 %
O2 OFF %
SpO2 OFF
OFF
bpm
06/20/2011
17:26

Menu area
(See p.37-39)

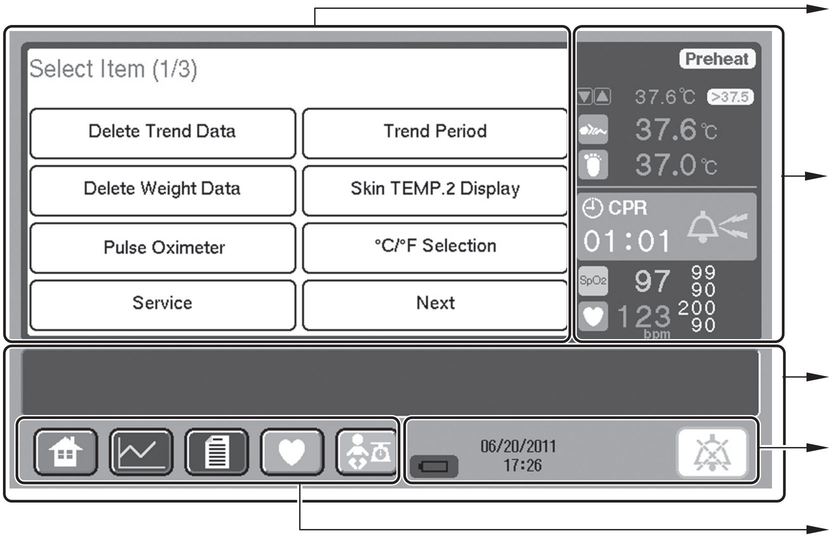
Incubator numerical values area (See p.34)

Message area✻
(See p.26)

Clock and other indicators area (See p.26)

Screen display switch area
(See p.25)

- Radiant warmer mode


Select Item (1/3)
Delete Trend Data
Trend Period
Delete Weight Data
Skin TEMP.2 Display
Pulse Oximeter
°C/°F Selection
Service
Next
Preheat
37.6℃ >37.5
37.6℃
37.0℃
CPR
01:01
SpO2 97 99 90
123 200 90
bpm
06/20/2011
17:26

Menu area
(See p.37-39)

Radiant warmer numerical values area (See p.34)

Message area✻
(See p.26)

Clock and other indicators area (See p.26)

Screen display switch area
(See p.25)

✻ The screen display switch area, the clock and other indicators area, and the message area are the same as those of the main screen (“2-3-4. Main Screen”). (Therefore there is no reference to them below.)

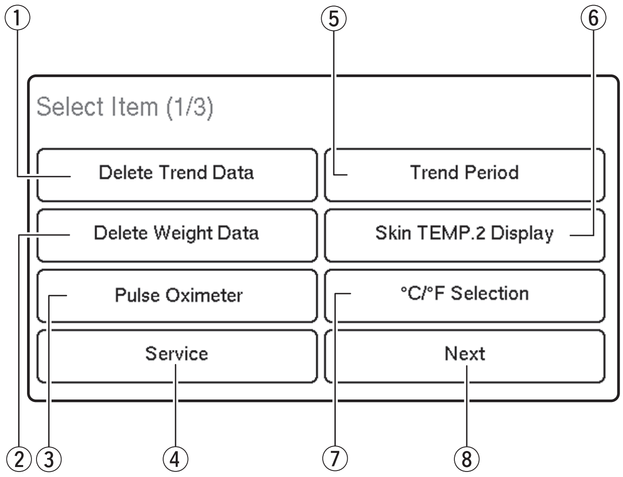
[Numerical values area]

✻ The incubator numerical values area and the radiant warmer numerical values area are the same as those of the weight screen (“2-3-6. Weight Screen”).

[Menu area 1]

✻ The menu area 1 is the same in the incubator mode and in the radiant warmer mode.

✻ This screen appears first when the menu screen is selected.

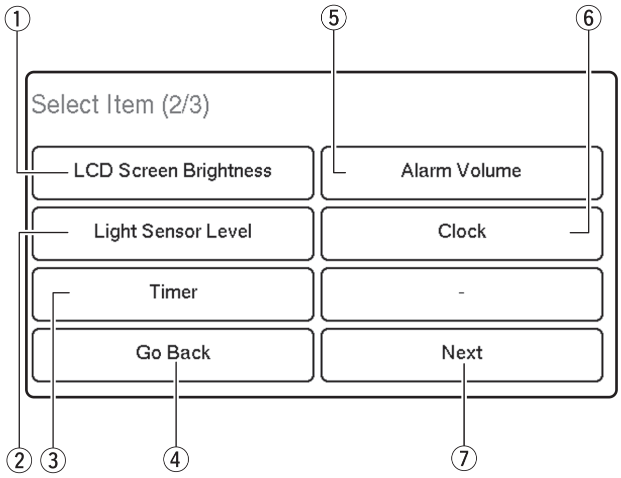

①
⑤
⑥
Select Item (1/3)
Delete Trend Data
Trend Period
Delete Weight Data
Skin TEMP.2 Display
Pulse Oximeter
°C/°F Selection
Service
Next
②
③
④
⑦
⑧

No.	Name	Description
①	Delete Trend Data switch	Touch this switch to delete the trend data displayed on the trend screen.
②	Delete Weight Data switch	Touch this switch to delete the weight data displayed on the weight screen.
③	Pulse Oximeter switch	Touch this switch to have the menu area 3 displayed for the pulse oximeter-related setting operation.
④	Service Menu switch	This switch is used for advanced settings of the unit. For details of the operation of this switch, see "2-4. Service Menu (How to Operate the Service Menu Screen)."
⑤	Trend Period selector switch	Touch this switch to select a trend period to be displayed on the trend screen.
⑥	Skin TEMP. 2 Display switch	Touch this switch to have either a detected skin temperature 2 or △T (detected skin temperature 1 – detected skin temperature 2) displayed in the temperature area.
⑦	°C/°F selector switch	Touch this switch to switch the unit of temperature from °C to °F, and vice versa.
⑧	Next switch	Touch this switch to have the menu area 2 displayed.

[Menu area 2]

✻ The menu area 2 is the same in the incubator mode and in the radiant warmer mode.

✻ Select [Next] in the menu area 1 to enter this screen.

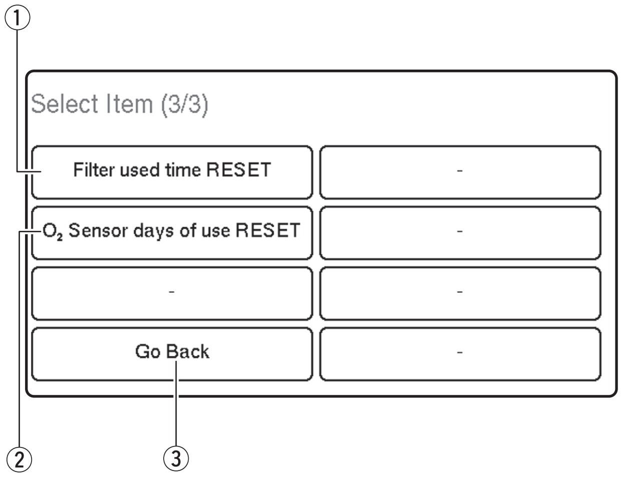

①
⑤
⑥
Select Item (2/3)
LCD Screen Brightness
Alarm Volume
Light Sensor Level
Clock
Timer
-
Go Back
Next
②
③
④
⑦

No.	Name	Description
①	LCD Screen Brightness selector switch	Touch this switch to set the brightness of the display screen to a desired level.
②	Light Sensor Level selector switch	Touch this switch to set the light sensor level to a desired level in switching to the night mode.
③	Timer selector switch	Touch this switch to select and set the timer type in the radiant warmer mode.
④	Go Back switch	Touch this switch to return to the menu area 1.
⑤	Alarm Volume selector switch	Touch this switch to set an alarm volume to a desired level.
⑥	Clock setting switch	Touch this switch to set the year, the month, the date, the hour and the minute.
⑦	Next switch	Touch this switch to have the menu area 3 displayed.

[Menu area 3]

✻ The menu area 3 is the same in the incubator mode and in the radiant warmer mode.

✻ Select [Next] in the menu area 2 to enter this screen.


①
Select Item (3/3)
Filter used time RESET
-
O₂ Sensor days of use RESET
-
-
-
Go Back
-
②
③

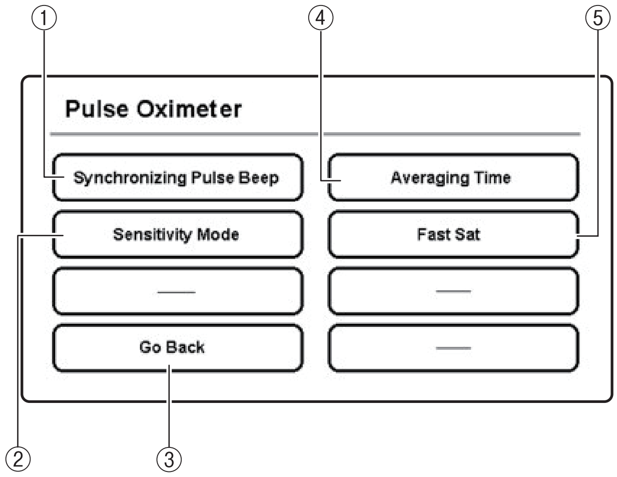
No.	Name	Description
①	Filter used time RESET switch	Touch this switch to check the number of hours the filter has been used and reset the elapsed time.
②	O2 Sensor days of use RESET switch	Touch this switch to check the number of days the oxygen sensors have been used and reset the elapsed days.
③	Go Back switch	Touch this switch to return to the menu area 2.

[Menu area 4]

✻ The menu area 4 is the same in the incubator mode and in the radiant warmer mode.

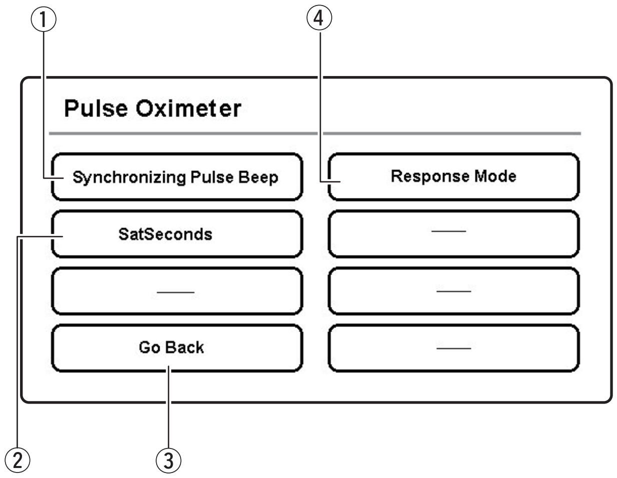
✻ Select [Pulse Oximeter] in the menu area 1 to enter this screen.

<The unit equipped with the Masimo pulse oximeter>


①
④
⑤
Pulse Oximeter
Synchronizing Pulse Beep
Averaging Time
Sensitivity Mode
Fast Sat
——
——
Go Back
——
②
③

No.	Name	Description
①	Synchronizing Pulse Beep volume selector switch	Touch this switch to set the volume of the synchronizing pulse beep of the pulse oximeter to a desired level.
②	Sensitivity selector switch	Touch this switch to set the sensitivity of the pulse oximeter to a desired level.
③	Go Back switch	Touch this switch to return to the menu area 1.
④	Averaging Time selector switch	Touch this switch to set the averaging time of the pulse oximeter.
⑤	FastSat selector switch	Touch this switch to enable or disable the FastSat mode of the pulse oximeter.

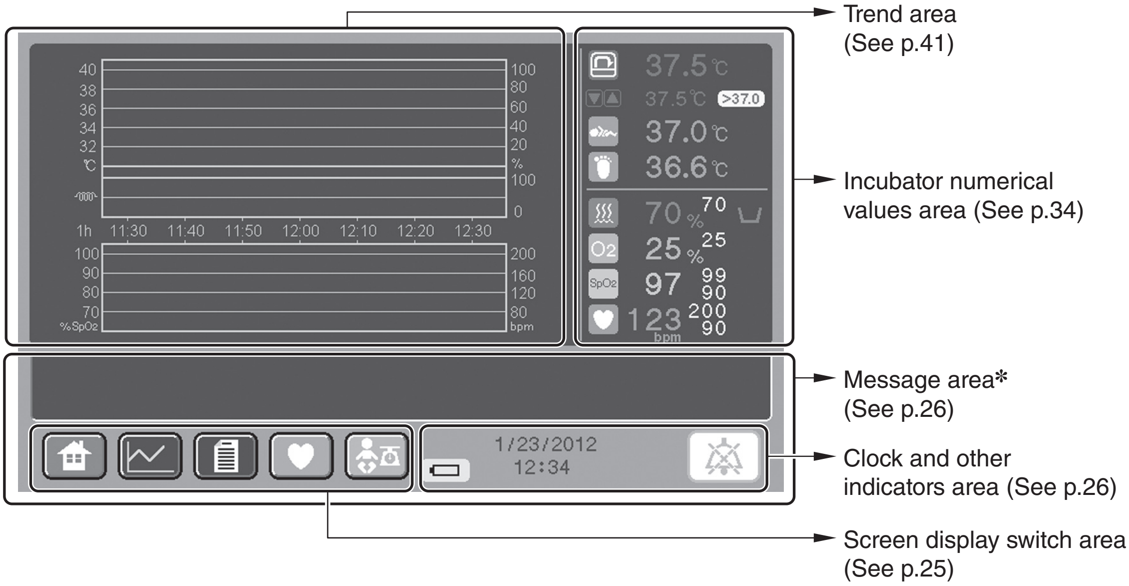
<The unit equipped with the Nellcor pulse oximeter>


①
④
Pulse Oximeter
Synchronizing Pulse Beep
Response Mode
SatSeconds
——
——
——
Go Back
——
②
③

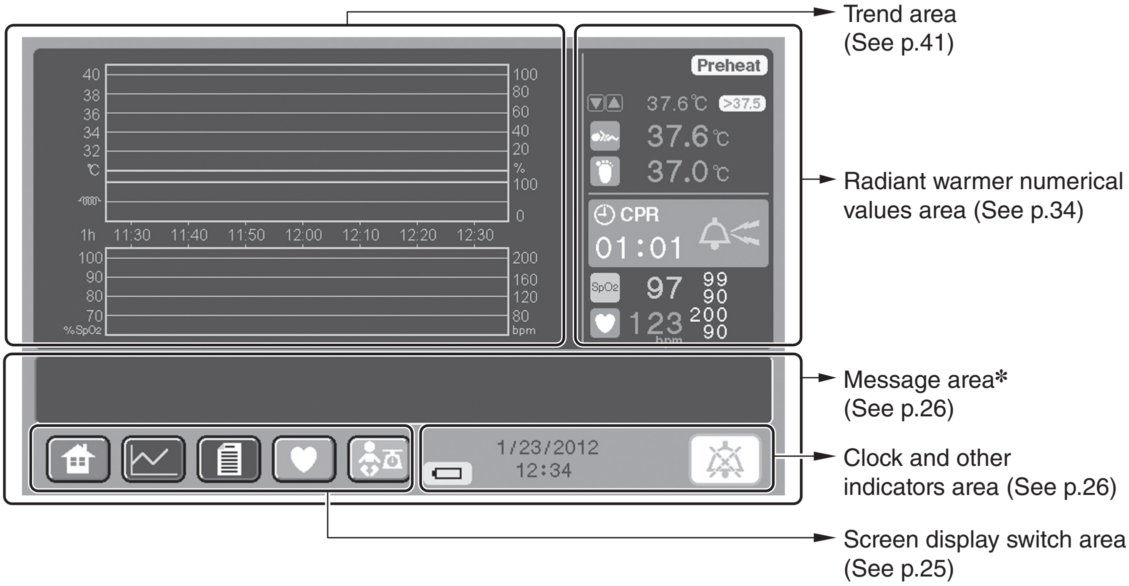
No.	Name	Description
①	Synchronizing Pulse Beep volume selector switch	Touch this switch to set the volume of the synchronizing pulse beep of the pulse oximeter to a desired level.
②	SatSeconds selector switch	Touch this switch to set SatSeconds as desired.
③	Go Back switch	Touch this switch to return to the menu area 1.
④	Response Mode selector switch	Touch this switch to set the response mode as desired.

2-3-8. Trend Screen

- Incubator mode


Trend area
(See p.41)
Incubator numerical values area (See p.34)
Message area*
(See p.26)
Clock and other indicators area (See p.26)
Screen display switch area
(See p.25)
37.5℃
37.5℃ >37.0
37.0℃
36.6℃
70 % 70
25 % 25
SpO2 97 99 90
123 200 90 bpm
1/23/2012
12:34

- Radiant warmer mode

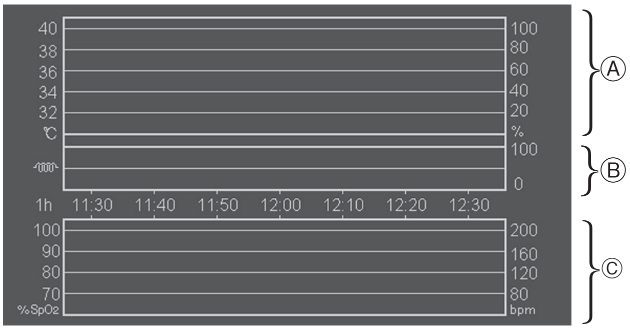

Trend area
(See p.41)
Radiant warmer numerical values area (See p.34)
Message area*
(See p.26)
Clock and other indicators area (See p.26)
Screen display switch area
(See p.25)
Preheat
37.6℃ >37.5
37.6℃
37.0℃
CPR
01:01
SpO2 97 99 90
123 200 90 bpm
1/23/2012
12:34

* The screen display switch area, the clock and other indicators area, and the message area are the same as those of the main screen ("2-3-4. Main Screen"). (Therefore there is no reference to them below.)

[Numerical values area]

* The incubator numerical values area and the radiant warmer numerical values area are the same as those of the weight screen ("2-3-6. Weight Screen").

[Trend area]


40
38
36
34
32
℃
100
80
60
40
20
%
100
0
1h
11:30
11:40
11:50
12:00
12:10
12:20
12:30
100
90
80
70
%SpO2
200
160
120
80
bpm
Ⓐ
Ⓑ
Ⓒ

No.	Name	Description
Ⓐ	Trend 1	A temperature scale (the incubator air temperature, the skin temperature 1 and the skin temperature 2) is provided on the left axis and a % scale (the relative humidity and the oxygen concentration) is provided on the right axis to display a trend graph of each item.
Ⓑ	Trend 2	Displays a trend graph of changes in the heater output (the main heater and the radiant warmer heater).
Ⓒ	Trend 3	A %SpO$_2$ scale is provided on the left axis and a pulse rate scale (bpm) is provided on the right axis to display a trend graph of each item.

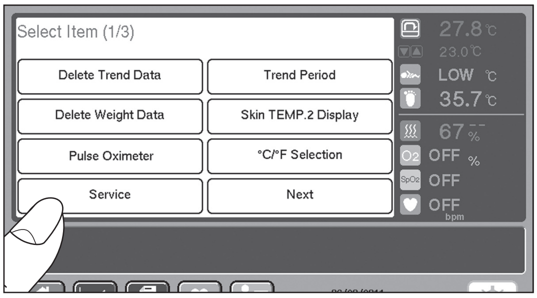
2-4. Service Menu (How to Operate the Service Menu Screen)

(The service menu is not accessible to ordinary users.)

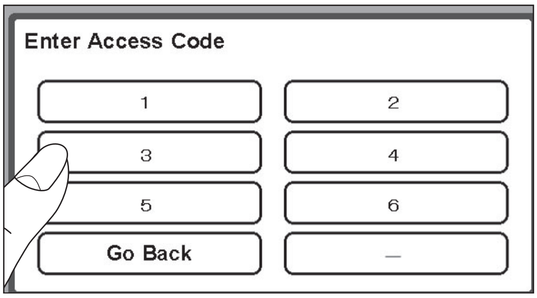
2-4-1. How to Enter the Service Menu

(1) Touch ▤ on any other screen, and the menu screen will appear.

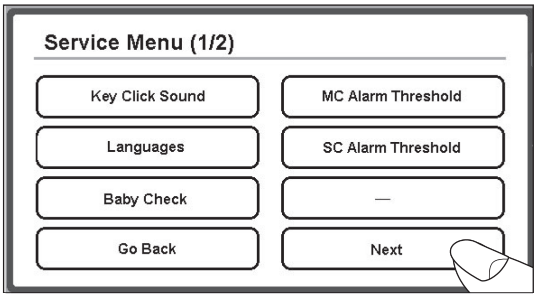
(2) Touch “Service Menu” on the menu screen.

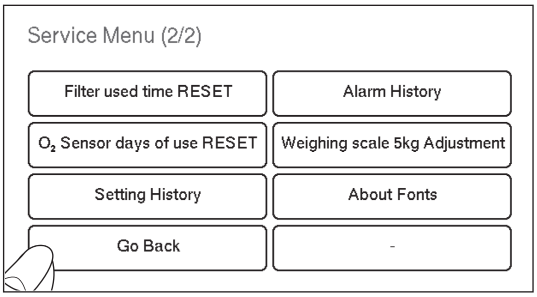

Select Item (1/3)
Delete Trend Data
Trend Period
Delete Weight Data
Skin TEMP.2 Display
Pulse Oximeter
°C/°F Selection
Service
Next
27.8°C
23.0°C
LOW °C
35.7°C
67 %
O2 OFF %
SpO2 OFF
OFF
bpm

(3) When the password entry screen is displayed, touch the numeric keys in the following order: “3” → “6” → “6” → “1”.


Enter Access Code
1
2
3
4
5
6
Go Back
—

(4) The Service Menu screen (1/2) is displayed. Touch [Next], and the Service Menu screen (2/2) will appear. To return to the screen (1/2), touch [Go back]. To return to the password entry screen, touch [Go back] on the Service Menu screen (1/2). To return to the menu screen, touch [Go back] on the password entry screen.


Service Menu (1/2)
Key Click Sound
MC Alarm Threshold
Languages
SC Alarm Threshold
Baby Check
—
Go Back
Next


Service Menu (2/2)
Filter used time RESET
Alarm History
O2 Sensor days of use RESET
Weighing scale 5kg Adjustment
Setting History
About Fonts
Go Back
-

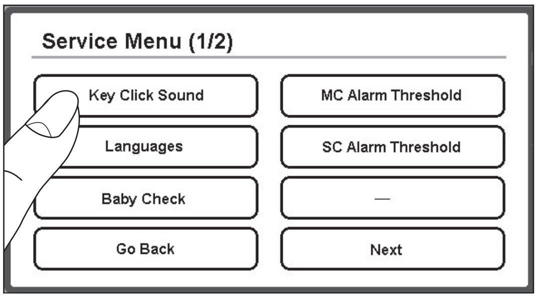
2-4-2. Operating the Service Menu Screen

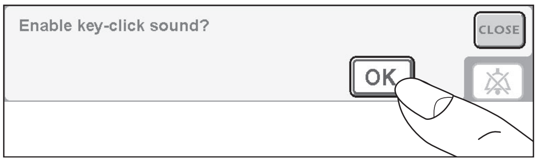
2-4-2-1. Setting the Key Click Sound

(1) Touch [Key Click Sound] on the Service Menu screen (1/2).

(2) When the key click sound has been disabled beforehand, a message to confirm whether to enable the key click sound will appear. Touch OK, and the key click sound will be enabled. To cancel this procedure, touch [CLOSE]. The key click sound will remain disabled.

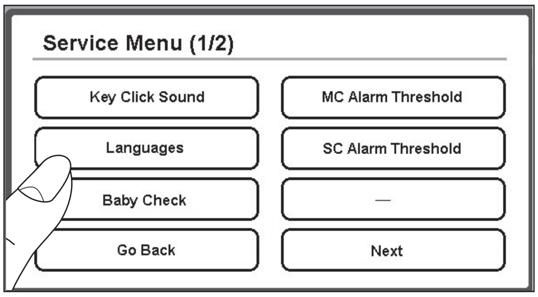
(3) When the key click sound has been enabled beforehand, a message to confirm whether to disable the key click sound will appear. Touch OK, and the key click sound will be disabled. To cancel this procedure, touch [CLOSE]. The key click sound will remain enabled.

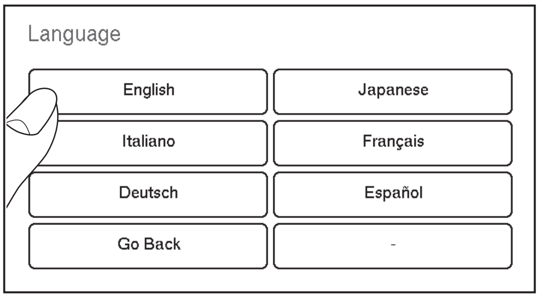

Service Menu (1/2)
Key Click Sound
MC Alarm Threshold
Languages
SC Alarm Threshold
Baby Check
—
Go Back
Next


Enable key-click sound?

2-4-2-2. Setting the Language

(1) Touch [Languages] on the Service Menu screen (1/2). A list of the languages available for use on the display will appear. Touch the language you want to use.


Service Menu (1/2)
Key Click Sound
MC Alarm Threshold
Languages
SC Alarm Threshold
Baby Check
—
Go Back
Next


Language
English
Japanese
Italiano
Français
Deutsch
Español
Go Back
-

2-4-2-3. Setting the Baby Check Alarm

⚠CAUTION

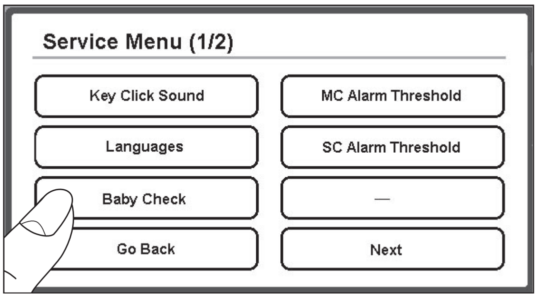
- ● You are not allowed to disable the baby check alarm (IEC 60601-2-21). If you need to disable the baby check alarm, contact your local Atom representative.

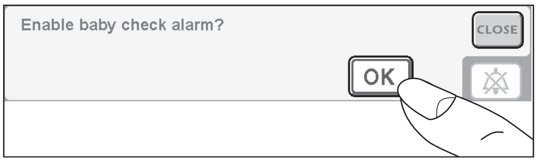
---

(1) Touch [Baby Check] on the Service Menu screen (1/2).

(2) When the baby check alarm has been enabled beforehand, a message to confirm whether to disable the baby check alarm will appear. Touch OK, and the baby check alarm will be disabled. To cancel this procedure, touch [CLOSE]. The baby check alarm will remain enabled.

(3) When the baby check alarm has been disabled beforehand, a message to confirm whether to enable the baby check alarm will appear. Touch OK, and the baby check alarm will be enabled. To cancel this procedure, touch [CLOSE]. The baby check alarm will remain disabled.


Service Menu (1/2)
Key Click Sound
MC Alarm Threshold
Languages
SC Alarm Threshold
Baby Check
—
Go Back
Next

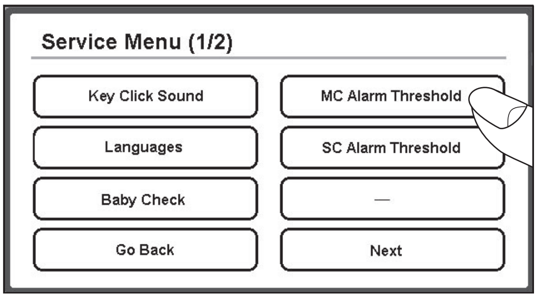

Enable baby check alarm?

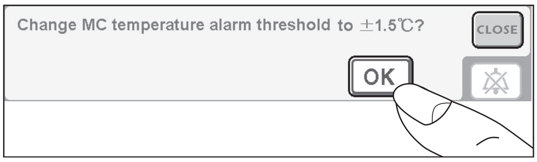
2-4-2-4. Setting the MC Alarm Threshold

(1) Touch [MC Alarm Threshold] on the Service Menu screen (1/2).

(2) When the threshold has been set to ±3.0℃ beforehand, a message to confirm whether to change it to ±1.5℃ will appear. Touch OK, and the threshold will be changed to ±1.5℃. To cancel this procedure, touch [CLOSE]. The threshold will remain ±3.0℃.

(3) When the threshold has been set to ±1.5℃ beforehand, a message to confirm whether to change it to ±3.0℃ will appear. Touch OK, and the threshold will be changed to ±3.0℃. To cancel this procedure, touch [CLOSE]. The threshold will remain ±1.5℃.


Service Menu (1/2)
Key Click Sound
MC Alarm Threshold
Languages
SC Alarm Threshold
Baby Check
—
Go Back
Next

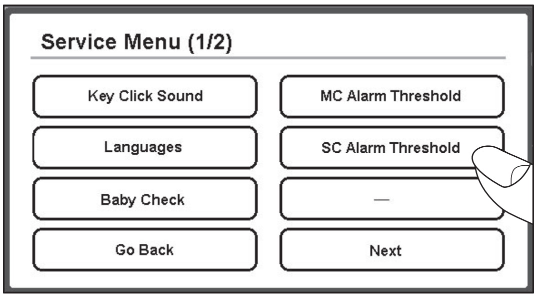

Change MC temperature alarm threshold to ±1.5℃?

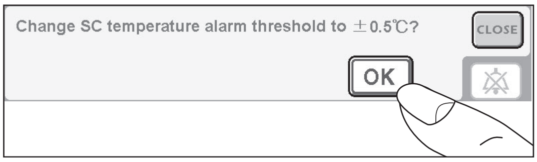
2-4-2-5. Setting the SC Alarm Threshold

(1) Touch [SC Alarm Threshold] on the Service Menu screen (1/2)

(2) When the threshold has been set to ±1.0℃ beforehand, a message to confirm whether to change it to ±0.5℃ will appear. Touch OK, and the threshold will be changed to ±0.5℃. To cancel this procedure, touch [CLOSE]. The threshold will remain ±1.0℃.

(3) When the threshold has been set to ±0.5℃ beforehand, a message to confirm whether to change it to ±1.0℃ will appear. Touch OK, and the threshold will be changed to ±1.0℃. To cancel this procedure, touch [CLOSE]. The threshold will remain ±0.5℃.

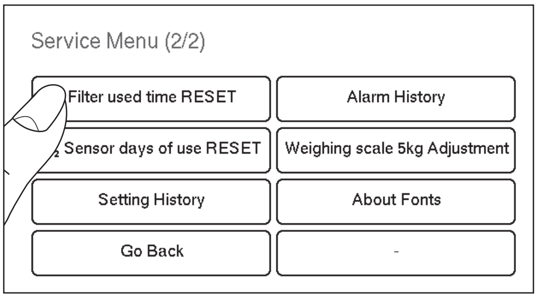

Service Menu (1/2)
Key Click Sound
MC Alarm Threshold
Languages
SC Alarm Threshold
Baby Check
—
Go Back
Next

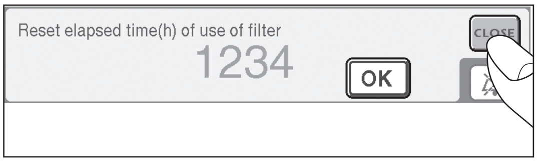

Change SC temperature alarm threshold to ±0.5℃?

2-4-2-6. Checking How Many Hours the Filter Has Been Used

(1) Touch [Filter used time (h) RESET] on the Service Menu screen (2/2).

(2) The number of hours for which the filter has been used so far and a message to confirm whether to reset the counter will appear. To finish the procedure without resetting the counter, touch [CLOSE]. To reset the counter, touch OK.

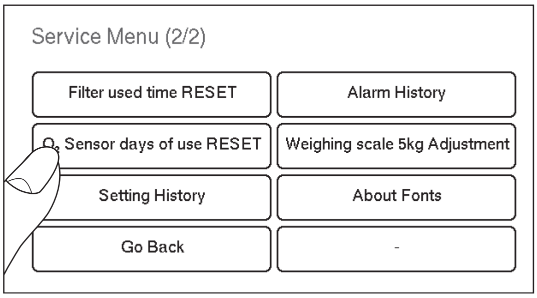

Service Menu (2/2)
Filter used time RESET
Alarm History
Sensor days of use RESET
Weighing scale 5kg Adjustment
Setting History
About Fonts
Go Back
-

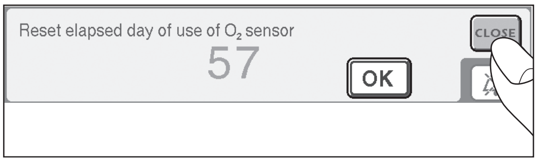

Reset elapsed time(h) of use of filter
1234

2-4-2-7. Checking How Many Days the Oxygen Sensors Have Been Used

(1) Touch [O2 sensor days of use RESET] on the Service Menu screen (2/2).

(2) The number of days for which the oxygen sensors have been used so far and a message to confirm whether to reset the counter will appear. To finish the procedure without resetting the counter, touch [CLOSE]. To reset the counter, touch OK.


Service Menu (2/2)
Filter used time RESET
Alarm History
O_2 Sensor days of use RESET
Weighing scale 5kg Adjustment
Setting History
About Fonts
Go Back
-

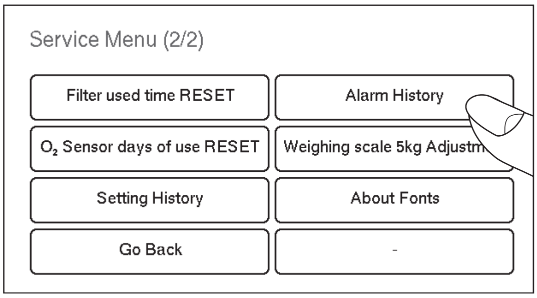

Reset elapsed day of use of O_2 sensor
57

2-4-2-8. Alarm History

(1) Touch [Alarm History] on the Service Menu screen.

(2) The time(s) when the power was turned on, the time(s) when the power was turned off, and the time(s) when an alarm or alarms occurred will be displayed.

(3) Touch [CLOSE] to finish viewing the alarm history.


Service Menu (2/2)
Filter used time RESET
Alarm History
O_2 Sensor days of use RESET
Weighing scale 5kg Adjustm
Setting History
About Fonts
Go Back
-

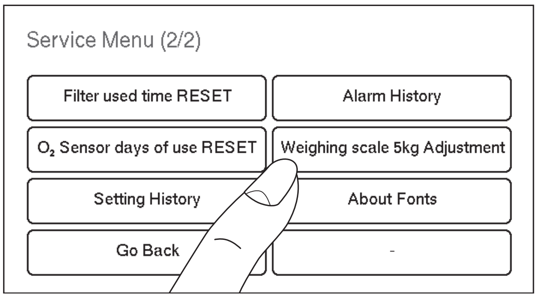
2-4-2-9. Adjusting the Weight Monitor with a 5 kg Weight

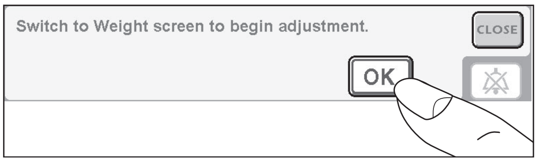
✻ Obtain a 5 kg weight in advance.

✻ Be sure to change the unit of weighing to be displayed on the screen to “g” before starting the 5kg adjustment.

(1) Touch [Weighing Scale 5 kg Adjustment] on the Service Menu screen (2/2).

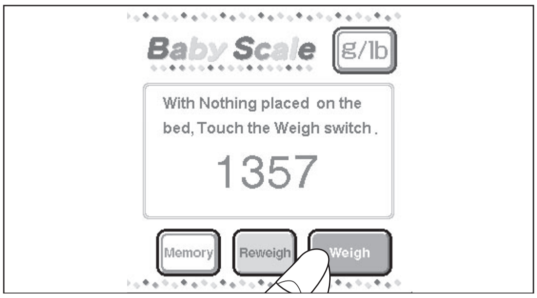
(2) A message to confirm whether to begin adjustment of the weighing scale will appear. Touch OK. After the message has disappeared, touch the weight screen display switch to have the weight screen displayed. If you touch [CLOSE] instead of OK, the adjustment procedure will not be started even when the weight screen is displayed.


Service Menu (2/2)
Filter used time RESET
Alarm History
O_2 Sensor days of use RESET
Weighing scale 5kg Adjustment
Setting History
About Fonts
Go Back
-

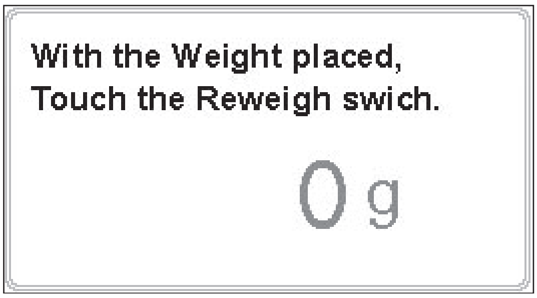

Switch to Weight screen to begin adjustment.

(3) When the weight screen appears, 0kg adjustment will be started. Do not place anything on the bed. Wait for 5 ~ 10 seconds until the weight reading stabilizes.

(4) After the weight reading has stabilized, touch Weigh, and a message “With the Weight Placed, Touch the Reweigh switch” will appear. Place a 5 kg standard weight gently on the center of the bed and wait for 5 ~10 seconds until the weight reading stabilizes.

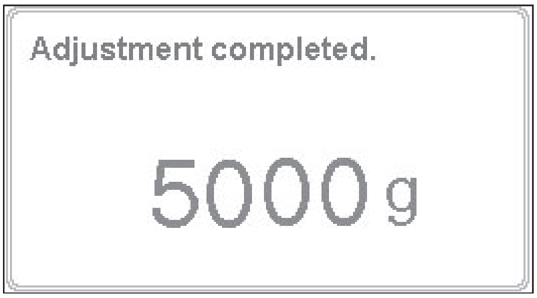

With Nothing placed on the bed, Touch the Weigh switch.

1357
Baby Scale
g/lb
Memory
Reweigh
Weigh


With the Weight placed, Touch the Reweigh swich.

0 g

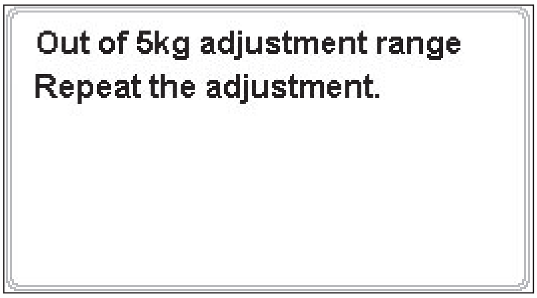
(5) After the weight reading has stabilized, touch Reweigh , and the 5kg adjustment will be completed.



Adjustment completed.

5000 g

(6) If a message “Repeat the adjustment” should appear, return to the 0kg adjustment.
With nothing placed on the bed, wait for 5 ~ 10 seconds until the weight reading stabilizes. Touch Weigh, and the message “With the Weight Placed, Touch the Reweigh switch” will appear. Place the 5 kg standard weight gently on the center of the bed and wait for 5 ~10 seconds. Then repeat (5) to complete the 5kg adjustment successfully.



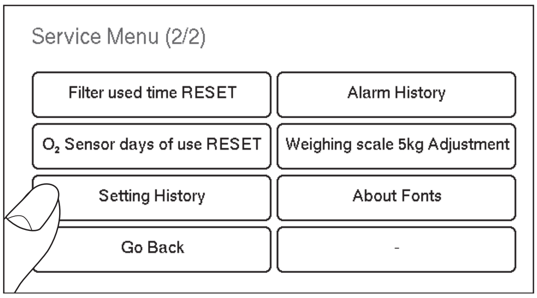
Out of 5kg adjustment range
Repeat the adjustment.

2-4-2-10. Setting History

(1) Touch [Setting History] on the Service Menu screen (2/2).

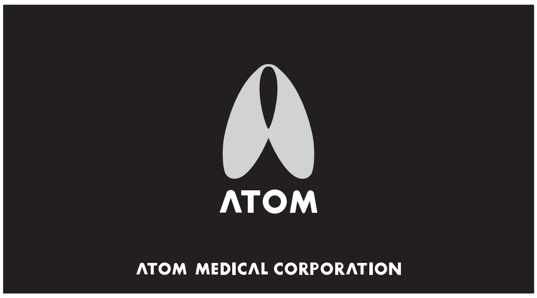
(2) A list of the date and time when the settings were done and the details of the settings will be displayed.

(3) Touch [CLOSE] to finish viewing the alarm history.

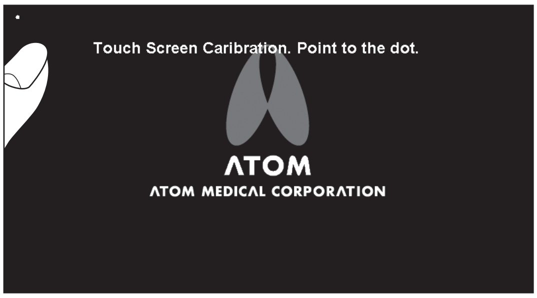

Service Menu (2/2)
Filter used time RESET
Alarm History
O_2 Sensor days of use RESET
Weighing scale 5kg Adjustment
Setting History
About Fonts
Go Back
-

2-4-3. Calibrating the Touch Panel

(1) Turn the power on and the start screen will appear. Touch this screen three times.


ATOM
ATOM MEDICAL CORPORATION

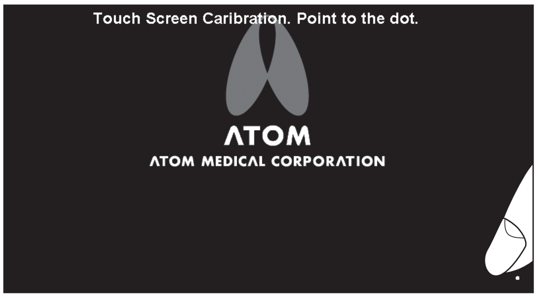
(2) A message “Touch Screen Calibration. Point to the dot” will appear. Touch the dot displayed on the upper left corner of the screen.



Touch Screen Caribration. Point to the dot.

ATOM
ATOM MEDICAL CORPORATION

(3) Then a dot will be displayed on the lower right corner of the screen. Touch the dot. The touch panel will have been calibrated successfully if the main screen is displayed.



Touch Screen Caribration. Point to the dot.

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[3] Maintenance Inspection

✻ The description in this section relates to a unit which is equipped with a weight monitor. Please skip any reference unrelated to your unit.

⚠CAUTION

❗ Medical institutions are responsible for performing the maintenance inspections.
They are allowed to entrust the maintenance inspections of the unit to an appropriate external contractor.

❗ Clean and disinfect the unit and its accessories before maintenance inspections, repairs, or disposal.

❗ Maintenance service should be performed properly by a qualified person in accordance with this Service Manual.

■ Precautions in performing maintenance inspections

1. When you choose to have the unit maintained and inspected or when the unit is found to be in need of repairs from the results of inspection, consult your local Atom representative and take one of the following measures.
   1) Ask someone who has completed a training course specified by Atom and who has sufficient technical knowledge and skills to do the work.
   2) Ask Atom to send its service engineer if a person who has completed a training course specified by Atom and who has sufficient technical knowledge and skills is not available.
   3) Ask Atom for its approval of returning the unit for repair service.
2. Read the operating precautions thoroughly before operating the unit.
3. Periodical inspection is needed to use the unit in the optimum condition.
4. Ensure that the unit will not be used if it is found to be defective.
   Take proper measures to ensure that a defective unit will not be used by mistake before it is properly inspected, repaired and has its settings changed for normal operation. Such measures include indicating on the unit that it is under inspection/repair and keeping it away from other devices that function correctly.

In order to use the unit safely for a longer period, perform the maintenance inspections described below.

- Inspection before use
  Check the basic functional operation of each part of the unit every time you are going to use the unit.

- Quarterly inspection
  Check the operation of each function of the unit every three months.
  However, the unit should be inspected at shorter intervals if it is used frequently.

- Parts requiring periodical replacement
  Some parts need to be replaced periodically depending on their period of use.

3-1. Inspection before Use

Check the following points every time you are going to use the unit.

⚠CAUTION

If you should notice any strange smell, strange noise, overheating or strange vibration when the power is applied to the main body in the inspection before use, stop using the unit immediately and contact your local Atom representative.

3-1-1. Visual Inspection

Item to check	Description
Appearance	The main body and the hood should be neither broken nor deformed. (Otherwise, the infant and/or the user may get injured due to breakage, etc.)
Snap-open access port packing	Each packing should be attached correctly to the access port. It should be intact. (Otherwise, the air tight seal may be compromised.)
Canopy packing	Each packing should be attached correctly to the hood. It should be intact. (Otherwise, the air tight seal may be compromised.)
X-ray cassette tray door packing	The packing should be attached correctly to the X-ray cassette tray door. It should be intact. (Otherwise, the air tight seal may be compromised.)
Patient circuit slot grommet	It should be attached correctly to the hood. It should be intact. (Otherwise, the air tight seal may be compromised.)
Tube introduction slit packing	Each packing should be attached correctly to the hood. It should be intact. (Otherwise, the air tight seal may be compromised.)
Sensor module	It should be neither broken nor deformed. (Otherwise, unsatisfactory control may result from faulty detection by the sensors.)
Admittance panel operating knob	Each knob should be held in place securely and should open and close the admittance panel reliably. (Otherwise, the infant may fall out of the baby compartment due to incomplete locking.)
Admittance panel operating lever	With an admittance panel closed, hold the admittance panel operating knobs and pull the admittance panel toward you. It should not open. (Otherwise, the infant may fall out of the baby compartment due to incomplete locking.)
Baby guard	It should be neither broken nor deformed. (Otherwise, the infant may fall out of the baby compartment due to incomplete attachment.)
Snap-open access port	Each access port should be held in place securely and should open and close reliably. With the snap-open access port closed, the red line should not be visible at the locking part. (Otherwise, the infant may fall out of the baby compartment due to incomplete locking.)
Tilting unit	The mattress platform should tilt smoothly when the tilting knob is operated. (Otherwise, the mattress platform may not tilt.)
Power switch	It should turn the power on and off reliably. (Otherwise, it may not function.)
Incubator mode switch, Radiant warmer mode switch	The incubator should enter the incubator mode when the incubator mode switch is pressed. The incubator should enter the radiant warmer mode when the radiant warmer mode switch is pressed.

Item to check	Description
Display	It should be fixed securely with the fixing device. (Otherwise, the display may become unstable or fall when a switch is operated.)
Caster	Each caster should rotate smoothly. The caster lock should function reliably. (Otherwise, the unit cannot be relocated easily.)
Filter	It should be clean. (Otherwise, air circulation may not be controlled properly.)
Skin temperature probe	An appropriate temperature should be displayed when the skin temperature probe is connected and the tip of the probe is held in your hand.
Skin temperature probe connecting port	The area around the connecting port should be neither broken nor unclean.
AC inlet	The AC inlet should be clean without any adherent medical fluid.
Power cord	The plug should not be deformed. The cord should not be damaged.
Height adjustment mechanism	It should operate smoothly without making any strange noise.
Activation of alarms	Before connecting the power cord, check the following: When the power switch is turned on, the power failure alarm indicator should flash and an audible alarm should sound. After connecting the power cord, check the following: When the power switch is turned on, the alarm lamp should come on and an audible alarm should sound.
Operation Manual	It should be kept where it is readily accessible. (Otherwise, the unit may be operated incorrectly due to lack of accessible information.)

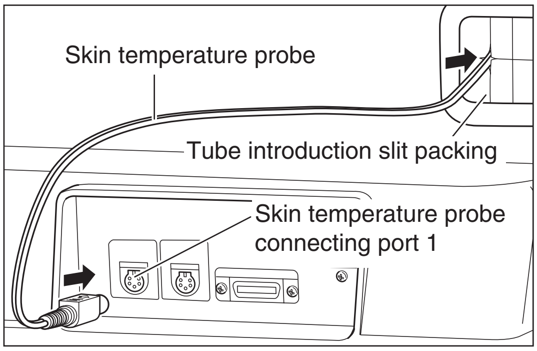
✻ Dead pixels (points on the screen that are always dark) may be found on the LCD display during the inspection. This is a phenomenon peculiar to an LCD display and not a malfunction. However, if an important message or a numerical value is not visible due to too many dead pixels, contact your local Atom representative.

3-1-2. Functional Inspection

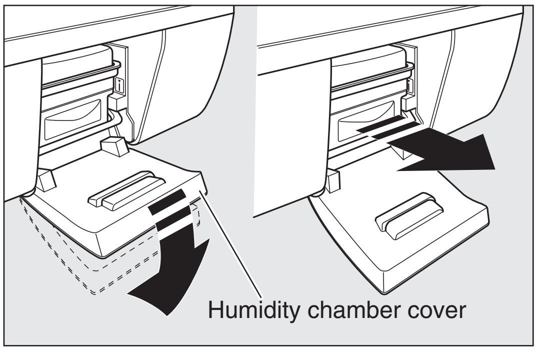
- Inspecting the basic functions of the incubator

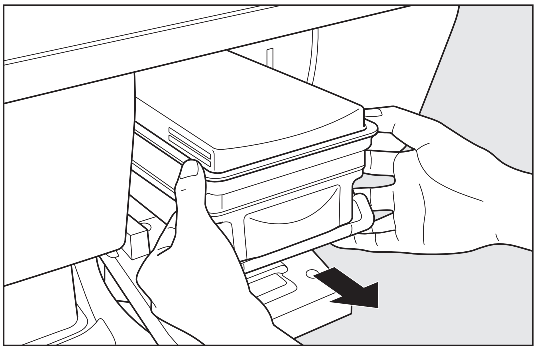
(Preparation 1)

(1) Connect the yellow skin temperature probe to the skin temperature probe connecting port 1 on the rear of the main body.


Skin temperature probe
Tube introduction slit packing
Skin temperature probe connecting port 1

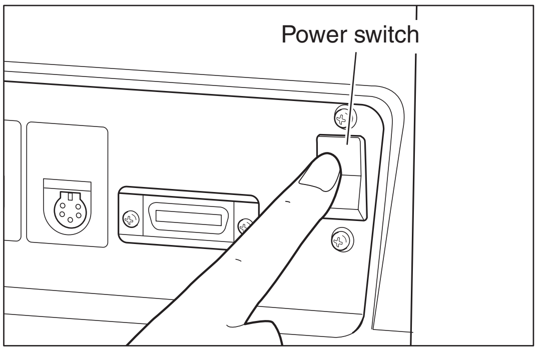
(2) Open the humidity chamber cover down to the position shown in the figure on the right. Draw out the humidity chamber until it stops halfway. Lift up the humidity chamber slightly and take it out.
Allow the humidity chamber and the water in it to cool down sufficiently before removing the humidity chamber. Otherwise, you may get scalded. Hold the humidity chamber with both hands because the humidity chamber filled with water is heavy.





(Checking the displays and the audible alarm)

(3) Turn on the power switch to activate the system.



Check:

① Does the alarm lamp come on and does the audible alarm sound immediately after the power switch is turned on?

② Is a numerical value displayed on the incubator air temperature display?

③ Is a numerical value displayed on the skin temperature 1 display?

④ Is a numerical value displayed on the relative humidity display?

⑤ Is the “humidity chamber off alarm” indicator is on?

⑥ Are the alarm indicators other than the “humidity chamber off alarm” indicator off?

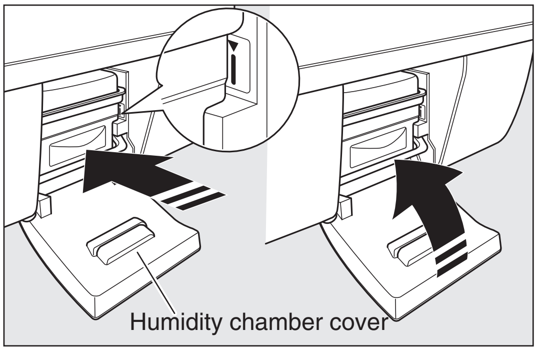
✻ Digital indication includes “LOW/HIGH” indication.

(Checking the humidity chamber)

(4) Push the humidity chamber in which the cartridge tank is placed gently into the main body until the marking shown in the figure on the right is visible and close the humidity chamber cover.

Check:

① Does the "humidity chamber off alarm" indicator go out?



(Checking the temperature setting operation)

(5) Set the temperature to 23.0°C in the manual control mode.

Check:

① Does the numerical value on the set temperature display change when either setting switch (▲•▼) is touched?

(Checking the relative humidity setting operation)

(6) Set the relative humidity to 95%Rh.

Check:

① Does the numerical value on the set relative humidity display change when either setting switch (▲•▼) is touched?

(Checking the oxygen controller)

(7) Enable the oxygen controller function.

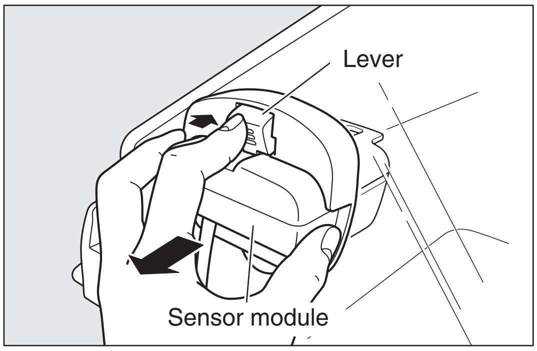
Check:

① Is a numerical value displayed on the oxygen concentration display?

(8) While pressing the lever, pull out the sensor module without removing it from the hood, and perform the calibration procedure.

Check:

① Is "21%" displayed on the oxygen concentration display after a while?



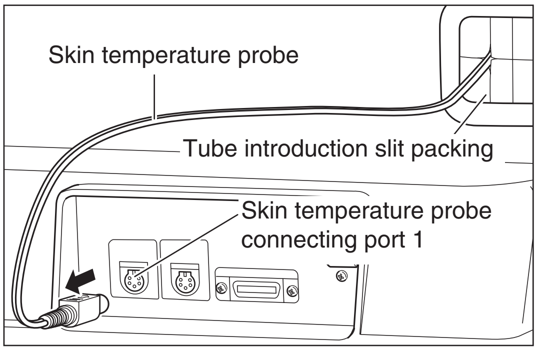
(Checking the skin temperature probe alarm)

(9) Set the temperature to 37.5°C in the servo control mode.

(10) Remove the skin temperature probe connected to the skin temperature probe connecting port 1 on the rear of the main body.

Check:

① Does the skin temperature probe alarm occur?


Skin temperature probe
Tube introduction slit packing
Skin temperature probe connecting port 1

(Checking the system failure alarm)

(11) Remove the sensor module connector connected to the rear of the main body.

Check:

① Does the system failure alarm occur?

(Checking the power failure alarm)

(12) Remove the power cord.

Check:

① Does the power failure alarm indicator flash?
② Does the audible alarm sound?

(Preparation 2)

(13) Turn off the power switch.

(14) Attach the power cord.

(Weight monitor)

(15) Connect the weight monitor cable to the connector for the weight monitor on the rear of the main body.

(16) Turn on the power switch to activate the system.

(17) Have the weight screen displayed.

Check:

① Is “_ _ _ _ g” displayed on the weight display area?

(18) Touch **Weigh**.

(19) Touch **Weigh** again while a message “Lift up baby from mattress” is displayed.

Check:

① Does the tare deduction process start and does the unit enter the ordinary weight monitor mode?
② Does the weight reading change when you push down the mattress platform lightly in the ordinary weight monitor mode?

(Inspection completed)

(20) Turn off the power switch.

⚠CAUTION

- If any function is found to be unsatisfactory, refer to the “Troubleshooting” section and perform the entire functional inspection once again.

3-1-3. Performance Inspection

Equipment required:
An oxygen flowmeter and an oxygen monitor are required to check the oxygen supply.

(Preparation)

(1) Connect the skin temperature probe to the skin temperature probe connecting port 1 on the rear of the main body and place it 10cm above the center of the mattress surface.

(2) Supply water in the humidity chamber and position it in the main body.

(3) Turn on the power switch to activate the system.

(4) Set the humidity setting to OFF.

(5) Set the oxygen control to OFF.

(Skin temperature control)

(6) Set the temperature to 36.0°C in the servo control mode.

Check:
① Does the reading on the skin temperature display stabilize at 36.0±0.5°C?

(Incubator air temperature control)

(7) Set the temperature to 36.0°C in the manual control mode.

Check:
① Does the reading on the incubator air temperature display stabilize at 36.0±1°C?

(Oxygen control)

(8) Perform the calibration procedure.

(9) Set the oxygen control to ON.

(10) Supply oxygen through the oxygen supply port 2.

(11) Set the oxygen concentration to 40% O_2.

Check:

① Does the reading on the oxygen concentration display stabilize at 40±2% O_2?

✻ When checking is completed, set the oxygen control to OFF.

(Oxygen supply)

(12) Supply oxygen through the oxygen supply port 1 at 10L/min using an oxygen flowmeter.

Check:

① Measure the oxygen concentration with an oxygen monitor. Is the reading at least 65% O_2?

✻ Stop the oxygen supply when checking is completed.

(Humidity control)

(13) Set the relative humidity to 90%Rh.

Check:

① Is the reading on the relative humidity display 90±3%Rh?

(Inspection completed)

(14) Turn off the power switch.

⚠CAUTION

● If any performance is found to be unsatisfactory, refer to the “Troubleshooting” section, and perform the entire performance inspection once again.

3-1-4. Checking and Calibrating the Weight Monitor

Check and calibrate the weight monitor periodically once a year.
For the calibration procedure, see “2-4-2-9. Adjusting the Weight Monitor with a 5kg Weight.”

3-2. Quarterly Inspection

Check the following points every three months.

Item to check	Procedure	Description
Incubator air temperature control	Set the temperature to 36.0°C in manual control.	The displayed incubator air temperature should be stable at 36.0±1°C.
Skin temperature control	Place the skin temperature probe at about 10cm above the center of the mattress surface in the incubator and set the temperature to 36.0°C in servo control.	The displayed skin temperature should be stable at 36.0±0.5°C.
Humidity control	Set RH to 90%Rh with the incubator air temperature set to 32.0°C.	The displayed RH should be stable at 90±3%Rh.
Oxygen concentration control	① When the oxygen controller is not used: Supply oxygen at 10L/min from the oxygen supply port 1. ② When the oxygen controller is used: Connect oxygen to the oxygen supply port 2 and, after 21%O_2 calibration, set the oxygen concentration to 40%O_2.	① The oxygen concentration in the incubator should rise to 65%O_2 or higher. ② 21%O_2 calibration should be completed successfully, and the displayed oxygen concentration should be stable at 40±2%O_2.
Pulse oximeter	Connect a sensor to the main body and attach the sensor to the inspector.	95~100% should be displayed on the %SpO_2 display. The pulse rate should also be displayed.
Fan	Check the exterior by visual inspection.	It should be neither broken nor deformed.
Humidifier	① Install the cartridge tank without any water in it. ② Open the humidity chamber cover. ③ Install the humidity chamber with the boiler cap off.	① The "no water alarm" indicator should come on. ② The "humidity chamber off alarm" indicator should come on. ③ The "humidity chamber off alarm" indicator should come on.
Power failure alarm	Turn the power on, and then remove the power plug from the power outlet.	The power failure alarm indicator should come on and an audible alarm should sound.
Weight monitor (The unit equipped with the weight monitor unit)	Place a 5kg weight on the center of the mattress and check the display.	The displayed value should be in the range of 5000±5g.

3-3. Inspection Checklist

⚠WARNING

❗ If any trouble is detected in any inspection, indicate on the unit that it is out of order and seek repair without fail.

❗ Contact your local Atom representative for further information on repairs.

Serial No. (   )   Date of Inspection (.   .   )   Inspector (   )

No.	**Item to check**	**Judgment**
	Inspection before use (every time)	
1	Are the main body and the hood free of breakage and deformation?	YES / NO
2	Are the access port packings free of breakage and attached securely to the access ports?	YES / NO
3	Are the canopy packings free of breakage and attached securely to the hood?	YES / NO
4	Is the X-ray cassette tray door packing free of breakage and attached securely to the X-ray cassette tray door?	YES / NO
5	Is the patient circuit slot grommet free of breakage and attached securely to the hood?	YES / NO
6	Are the tube introduction slit packings free of breakage and attached securely to the hood?	YES / NO
7	Is the sensor module free of breakage and deformation and fixed securely to the hood?	YES / NO
8	Are the admittance panel operating knobs held in place securely and do they operate reliably?	YES / NO
9	Are the admittance panels locked securely?	YES / NO
10	Are the baby guards free of breakage and deformation?	YES / NO
11	Are the access ports held in place securely and do they open and close reliably?	YES / NO
12	Does the tilting unit operate smoothly?	YES / NO
13	Does the power switch turn the power on and off reliably?	YES / NO
14	Does the incubator enter the incubator mode when the incubator mode switch is pressed? Does the incubator enter the radiant warmer mode when the radiant warmer mode switch is pressed?	YES / NO
15	Is the fixing device of the display free of breakage and is the display fixed securely?	YES / NO
16	Does each caster rotate smoothly and do the caster locks function reliably?	YES / NO
17	Is the filter clean without any blackish dirt?	YES / NO
18	Is the correct skin temperature displayed when you hold the tip of the skin temperature probe in your hand?	YES / NO
19	Is the area around the skin temperature connecting port free of breakage and dirt?	YES / NO
20	Is the AC inlet clean without any adherent medical fluid?	YES / NO
21	Is the plug of the power cord free of deformation and is the power cord free of damage?	YES / NO
22	Does the height adjustment mechanism operate smoothly without making any strange noise?	YES / NO
23	Does the power failure alarm function properly and does the alarm lamp come on properly?	YES / NO
24	Is the Operation Manual readily accessible?	YES / NO
	Quarterly inspection	
1	Is the displayed incubator air temperature stable at 36.0±1°C in manual control?	YES / NO
2	Is the displayed skin temperature stable at 36.0±0.5°C in servo control?	YES / NO
3	Is the displayed RH stable at 90±3%Rh?	YES / NO
4	Does the oxygen concentration rise to 65%O_2 or higher at 10L/min?	YES / NO
5	Is the displayed oxygen concentration stable at 40±2%O_2 when the oxygen control function is on?	YES / NO
6	Is an SpO_2 value displayed when an SpO_2 sensor is connected?	YES / NO
7	Is the fan free of breakage?	YES / NO
8	Do the “no water alarm” indicator and the “humidity chamber off alarm” indicator come on?	YES / NO
9	Does an audible alarm sound and does the power failure alarm indicator flash when the power plug is removed from the power outlet?	YES / NO
10	Does the weight display show a correct numerical value when a 5kg weight is weighed?	YES / NO

3-4. Periodical Replacement Parts and How to Replace them

Periodical replacement parts are those which gradually deteriorate and wear down with use. They need periodical replacement to keep the accuracy and performance of the unit at a proper level. Timing of replacement varies with the frequency and conditions of use. Consult your local Atom representative for replacement.

Part name	Period of use	Reason for replacement
Filter	3 months	Dirtiness due to dust or defective air circulation control due to clogging
Tube introduction slit packing	1~2 years	Decreased air tightness due to breakage or deformation
Admittance panel packing	1~2 years	Decreased air tightness due to breakage or deformation
Canopy packing	1~2 years	Decreased air tightness due to breakage or deformation
Patient circuit slot grommet	1~2 years	Decreased air tightness due to breakage or deformation
Snap-open access port packing	1~2 years	Decreased air tightness due to breakage or deformation
X-ray cassette tray door packing	1~2 years	Decreased air tightness due to breakage or deformation
Mattress	1~2 years	Decreased elasticity due to breakage or deformation
Rotary damper (for an admittance panel)	2 years	Reduced damper function
Fan motor	3 years	Decreased air circulation
Fan	3 years	Decreased air circulation
Snap-open access port	3 years	Incomplete locking
Humidity chamber	3 years	Insufficient humidification due to breakage or deformation
Battery for power failure alarm	4 years	Defective power failure alarm function due to battery life
Battery for the display	4 years	Defective clock control due to battery life
Oxygen sensor	Variable depending on operating conditions*	Defective calibration or defective oxygen control due to sensor life

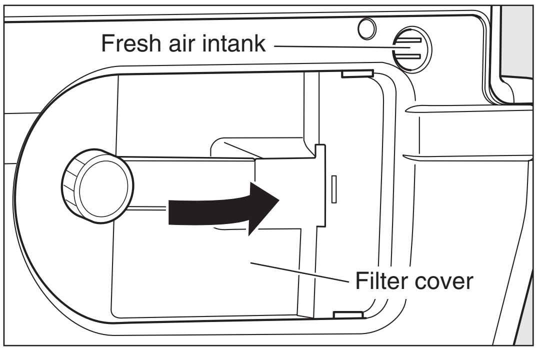
✻ The oxygen sensor is a consumable item and its life is affected greatly by the ambient conditions under which it is used (i.e. ambient temperature, oxygen concentration). It is recommended to replace an oxygen sensor when more than one year has passed since it was taken out of its package.

3-4-1. Replacing the Filter

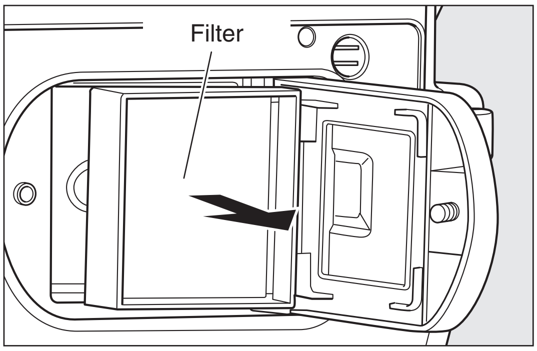
⚠CAUTION

❗ Replace the old filter with a new one every three months in general. The dirtiness of the filter varies with the degree of air pollution and the frequency of operation. Check the dirtiness of the filter through the window of the filter cover. If the filter should be found discolored, replace it with a new one even if the three-month interval is not over yet.

(1) Loosen the screw of the filter cover and open the cover.



(2) Detach the filter slowly. Take out the dirty filter, taking care not to let the dirt fly about.



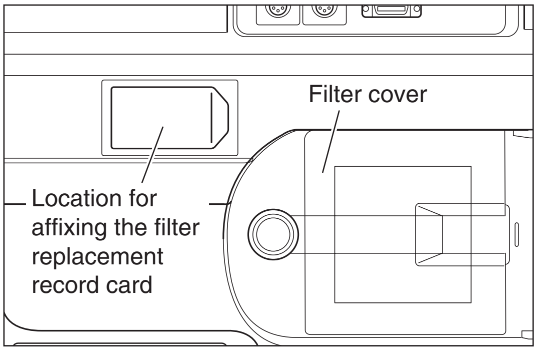
⚠CAUTION

- ● Do not block the fresh air intake with a wall or a cloth, etc.

(3) Discard the dirty filter. Clean the filter cover and the filter holder with a soft cloth dampened with a disinfectant solution and wrung out sufficiently.

(4) Attach a new filter to the filter holder. Ensure that the filter is installed correctly. Enter the date of replacement in the accompanying filter replacement record card and affix it in place as shown in the figure on the right for future reference.

(5) Tighten the screw of the filter cover and close the cover.



⚠WARNING

- ● Do not attempt to reuse the dirty filter by washing it or attaching it inside out.
- ● Open the filter cover only to replace the old filter with a new one.

✻ The unit counts the number of hours of operation after the filter is replaced. When the time comes to replace the filter, a message appears on the screen to remind the user. The counter must be reset after the filter is replaced. Otherwise, the message will remain on. To reset the counter, see "2-4-2-6. Checking How Many Hours the Filter Has Been Used."

3-4-2. Replacing the Oxygen Sensor

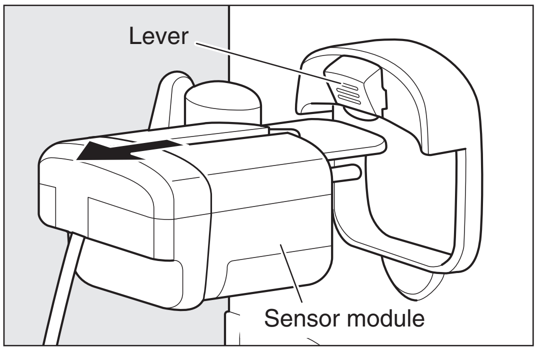
⚠WARNING

- As part of daily inspection, check the oxygen sensor for any sign of deterioration or liquid leakage. If any cracks should be found on the external surface, replace it immediately with a new one.
- The oxygen sensor is a sealed device containing a potassium hydroxide electrolyte. The electrolyte may leak out if the sensor should be damaged when dropped, etc. If the electrolyte should touch your skin or clothes, wash it away with copious amounts of water. If it should get in your eye, wash your eye immediately with copious amounts of water and consult the doctor.
- Dispose of a used oxygen sensor in accordance with the appropriate disposal procedure.

⚠CAUTION

- Replace the two oxygen sensors at the same time.
- If an oxygen sensor alarm remains on, the oxygen sensors may be defective. Replace the old oxygen sensors with new ones.
- Leave the oxygen sensor in the atmosphere for more than one hour after taking it out of its package. The sensor output is not stable immediately after the sensor is taken out of its package and an oxygen sensor alarm may occur.
- Avoid direct sunlight and high temperature when storing the oxygen sensor.
- The life span of the oxygen sensor varies depending on the ambient conditions under which it is used. It is recommended to replace an oxygen sensor when more than one year has passed since it was taken out of its package.
- ⃠ Avoid mechanical shocks to the oxygen sensors when replacing them.

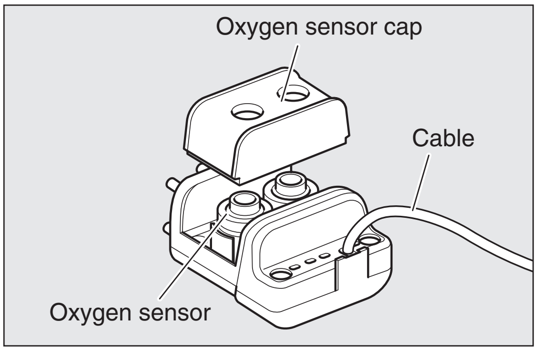
(1) Remove the connector of the sensor module from the rear of the main body. While pressing the lever, pull the sensor module out of the hood.



(2) Remove the oxygen sensor cap and take out the two oxygen sensors from the sensor module.

(3) Attach the new sensors to the module by fitting each sensor head properly in the corresponding holder in the module.

(4) Attach the oxygen sensor cap and replace the sensor module to its former position in the hood. After connecting the plug of the sensor module to the main body, calibrate the sensors.



✻ The unit counts the number of hours that pass after the oxygen sensors are replaced. When the time comes to replace the sensors, a message appears on the screen to remind the user. The counter must be reset after the oxygen sensors are replaced. Otherwise, the message will remain on. To reset the counter, see “2-4-2-7. Checking How Many Days the Oxygen Sensor Have Been Used.”

[4] Cleaning and Disinfection

⚠WARNING

❗ Before cleaning and disinfecting the unit, be sure to turn the power off, remove the power plug from the power outlet, and allow the incubator and the heaters to cool down sufficiently.

⚠CAUTION

❗ This product is shipped without being disinfected. Be sure to clean and disinfect the unit before using it for the first time after purchase.

❗ See the accompanying document of the disinfectant you are going to use for appropriate concentration, contact time and handling. Follow the directions for use and dosage and precautions given in the document.

❗ Before cleaning or maintaining the unit, check that the oxygen supply to the incubator has been stopped and that the incubator has been disconnected from the oxygen supply source. Cleaning or maintaining the incubator in an environment where the oxygen concentration is at a high level may lead to a fire or an explosion.

❗ Clean and disinfect the unit whenever you use it for another infant.

❗ Clean and disinfect the unit whenever you notice any dirt or stains which might cause infection.

❗ After cleaning and disinfection, assemble the removed parts correctly and check that the unit operates normally.

❗ After cleaning and disinfection, remove the disinfectant solution completely and then use the incubator.

Obtain a soft clean cloth and a disinfectant solution for cleaning and disinfection.

✻ Recommended disinfectant solutions include:

- Benzalkonium chloride aqueous solution (e.g. Osvan)
- Benzethonium chloride aqueous solution (e.g. Hyamine)
- Chlorhexidine aqueous solution (e.g. Hibitane)

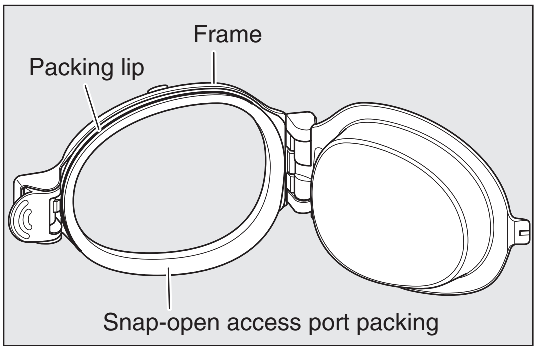
Do not use any abrasive, cleaner, alcohol, acetone or other solvent for cleaning and disinfection. Do not autoclave.

4-1. Hood Assembly

- Snap-open access port packing

Remove the rubber packings from the snap-open access ports. Immerse and clean them in a disinfectant solution.

To replace each rubber packing to its former position, be sure to smooth out wrinkles along the packing lip so that the access port packing will fit perfectly in the groove around the frame of the snap-open access port as shown in the figure on the right.

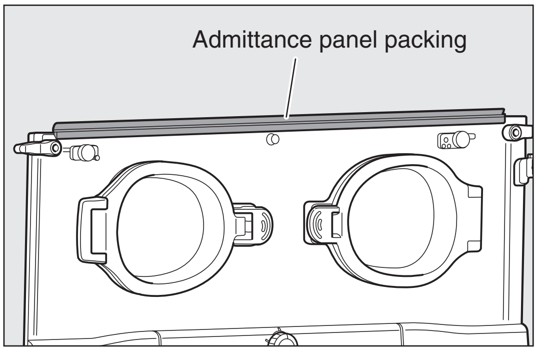

Frame
Packing lip
Snap-open access port packing

⚠CAUTION

● The snap-open access port packings are designed for the unit only. Do not attach any other packings to the unit.

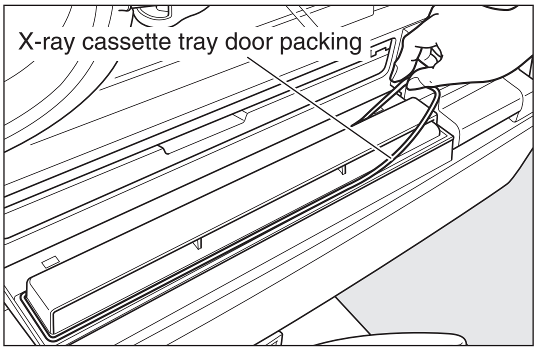
- Admittance panel packing

Remove the rubber packings from the admittance panels. Immerse and clean them in a disinfectant solution.


Admittance panel packing

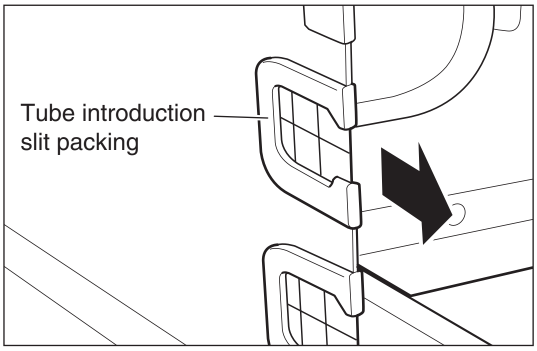
- X-ray cassette tray door packing

Remove the packing from the X-ray cassette tray door. Immerse and clean it in a disinfectant solution. To replace the packing to its former position, fit the packing in the groove around the X-ray cassette tray door.


X-ray cassette tray door packing

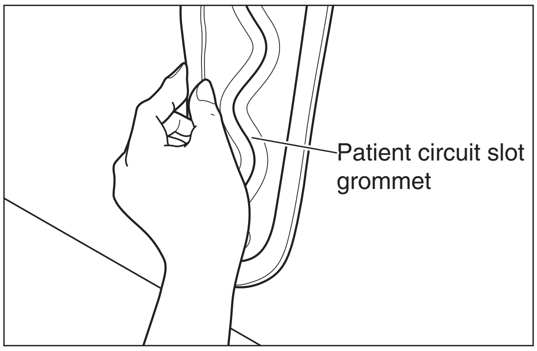
- Tube introduction slit packing

Remove the tube introduction slit packings. Immerse and clean them in a disinfectant solution.


Tube introduction slit packing

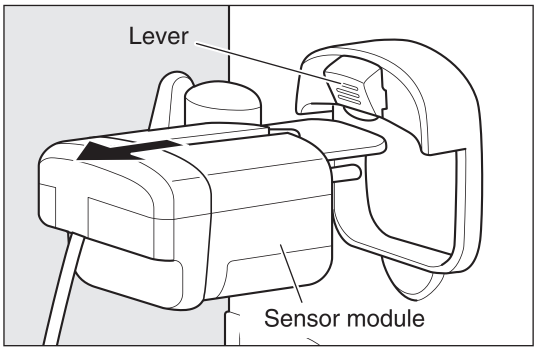
- Patient circuit slot grommet

Remove the patient circuit slot grommet. Immerse and clean it in a disinfectant solution.



- Sensor module

Remove the connector of the sensor module from the rear of the main body. While pressing the lever, pull the sensor module out of the hood. Clean the sensor module with a soft cloth dampened with a disinfectant solution and wrung out sufficiently.

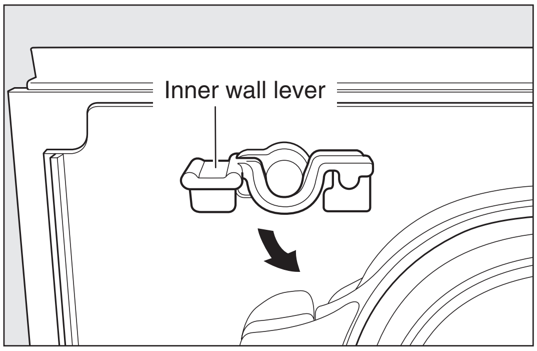


⚠CAUTION

- Do not immerse the sensor module in water. Immersing it in water may cause it to malfunction.

- Inner panel

Open the admittance panel. Push down the inner wall levers and pull the inner panel away from the hood. Clean the inner panel with a soft cloth dampened with a disinfectant solution and wrung out sufficiently.

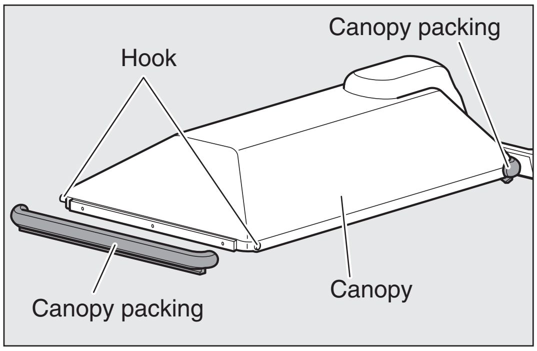


⚠CAUTION

- The inner panel cannot be removed from the hood.

- Canopy packing

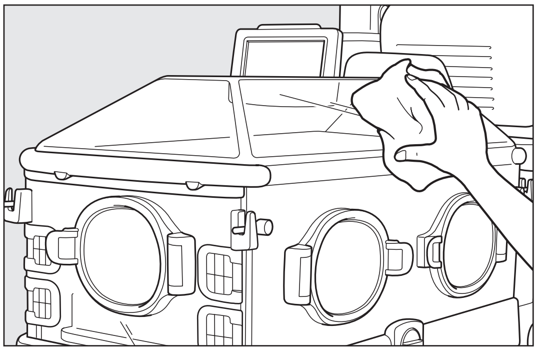
Remove the canopy packings from the hooks on both corners of the canopy. Immerse and clean them in a disinfectant solution.



⚠CAUTION

- When attaching the canopy packings, make sure that they are attached securely to the hooks on both corners of the canopy and fit securely in the grooves.

- Hood



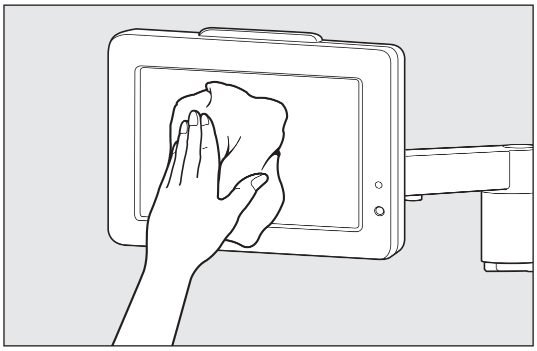
Clean the inside and the outside of the hood with a soft cloth dampened with a disinfectant solution.

✻ Replace all the removed parts to their former positions. Make sure that they are attached correctly.

⚠CAUTION

- ● Before cleaning and disinfecting the hood, make sure that the unit is in the incubator mode.

- Display



Display: Clean the display with a soft cloth dampened with a disinfectant solution.

Surface of the liquid crystal panel: Clean the surface of the liquid crystal panel lightly with a dry cloth. Use a specified disinfectant solution when necessary.

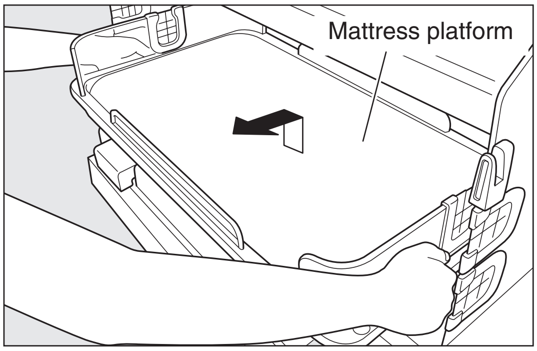
⚠CAUTION

- ● The surface of the liquid crystal panel is specially treated. Do not rub the panel surface strongly. The surface may get damaged.
  When cleaning the surface of the liquid crystal panel with a disinfectant solution, soak a cloth in the solution, wring out the cloth sufficiently, and then clean the surface softly so that no solution will enter inside.
- ● Do not immerse the display in water or a disinfectant solution. Immersing it in water or a disinfectant solution may cause it to malfunction.

4-2. Mattress Platform and Parts Beneath

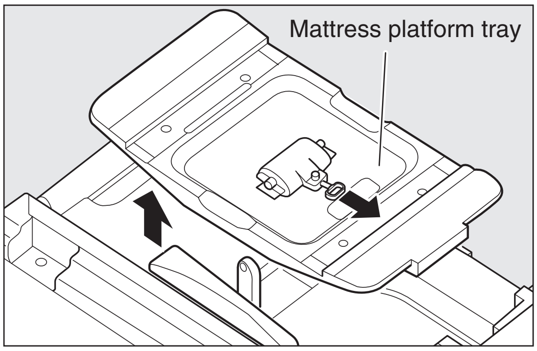
- Mattress platform (with X-ray cassette tray)

Hold both ends of the mattress platform and slide the mattress platform toward you. When it has been drawn out just halfway, lift it up and take it out. Clean it with a soft cloth dampened with a disinfectant solution.
To replace the mattress platform to its former position, put it down on the center of the mattress platform tray. Make sure that the legs of the mattress platform are attached to the correct positions.

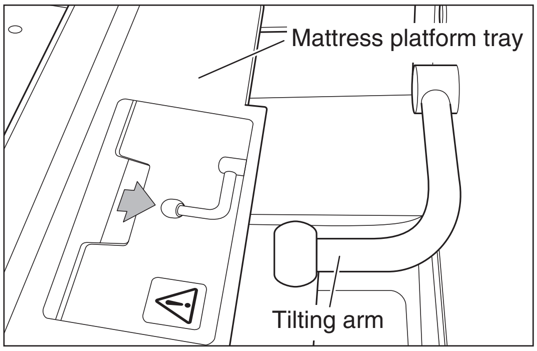


- Mattress platform tray (with latch)

Pull the hook on the mattress platform tray. Lift the tray up and disengage it from the tilting arm. Clean it with a soft cloth dampened with a disinfectant solution.

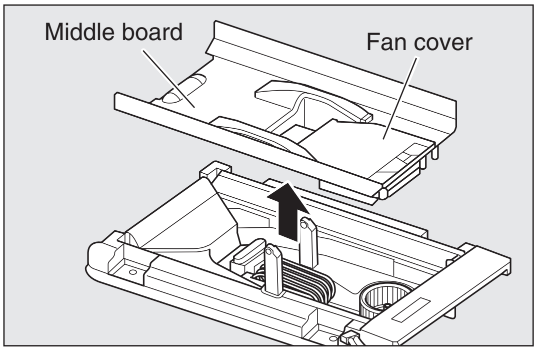


To replace the mattress platform tray to its former position, make sure that it is engaged securely with the tilting arm.



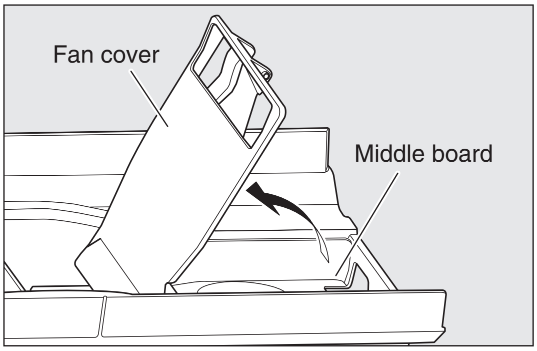
- Middle board (with fan cover)

With the admittance panels on both sides open, grasp one end of the middle board with one hand and the concave portion of the fan cover with the other hand. Then lift up the middle board. Clean it with a soft cloth dampened with a disinfectant solution.



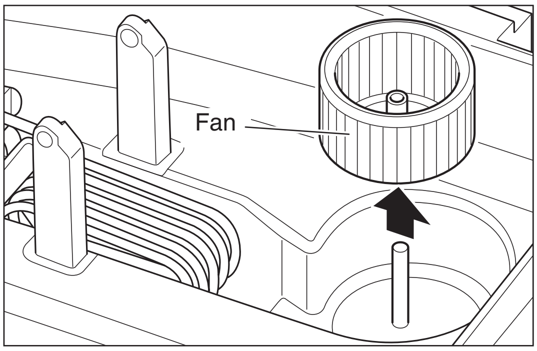
- Fan cover

Open the fan cover and clean it with a soft cloth dampened with a disinfectant solution.



- Fan

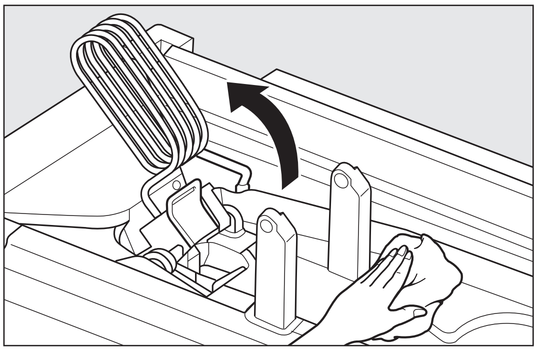
Pull up and remove the fan. Immerse and clean it in a disinfectant solution. To replace the fan to its former position, push it down firmly until it stops.



- Conditioning chamber

The conditioning chamber will become accessible when all the components mentioned above have been removed. Pull up the heater and clean the inside of the conditioning chamber thoroughly with a soft cloth dampened with a disinfectant solution.

✻ Replace all the removed components to their former positions in reverse order. Make sure that they are attached correctly.



⚠CAUTION

● When cleaning the conditioning chamber with the heater up, be careful not to get your fingers or hand caught.

● To replace the heater to its former position, push it down gently.

4-3. Heater for Radiant Warmer

⚠WARNING

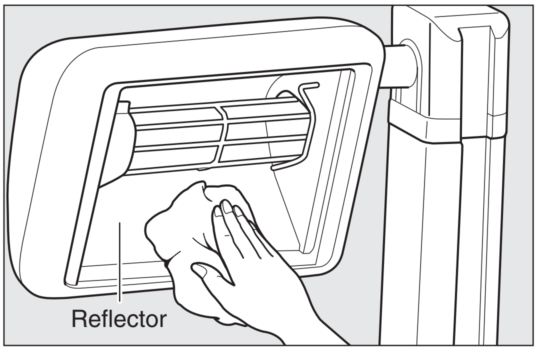
Before cleaning the canopy, be sure to turn the heater off and allow it to cool down sufficiently.

⚠CAUTION

Do not use ethyl alcohol (ethanol) to clean any parts of the radiant warmer other than the heater reflector.

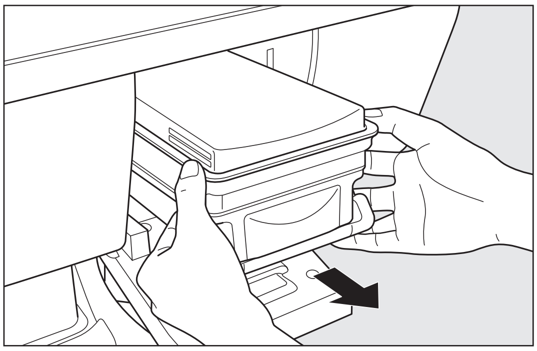
(1) Clean the radiant warmer with a soft cloth dampened with a disinfectant solution.

(2) Clean the heater reflector of the radiant warmer with a piece of absorbent cotton dampened with ethyl alcohol to keep it always polished.



4-4. Humidity Chamber

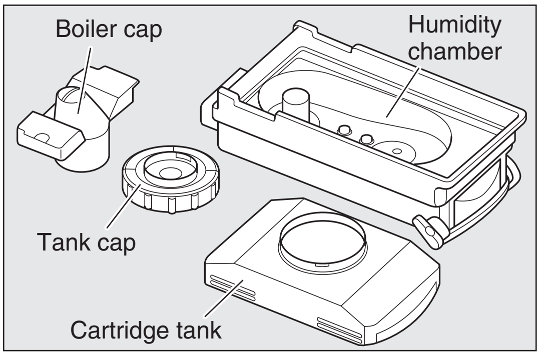
(1) Open the humidity chamber cover and draw out the humidity chamber until it stops halfway. Lift up the humidity chamber slightly and take it out.



⚠CAUTION

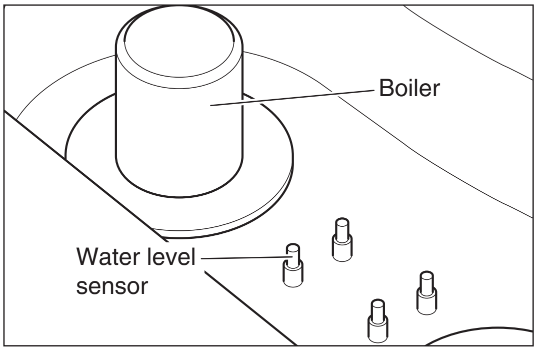
- Allow the humidity chamber and the water in it to cool down sufficiently before removing the humidity chamber. The temperature of the water will have exceeded 70°C, so that you may get scalded. Hold the humidity chamber with both hands because the humidity chamber filled with water is heavy.

(2) Remove the cartridge tank, the tank cap and the boiler cap from the humidity chamber. Immerse and clean them in a disinfectant solution.
Never immerse the humidity chamber in a disinfectant solution.



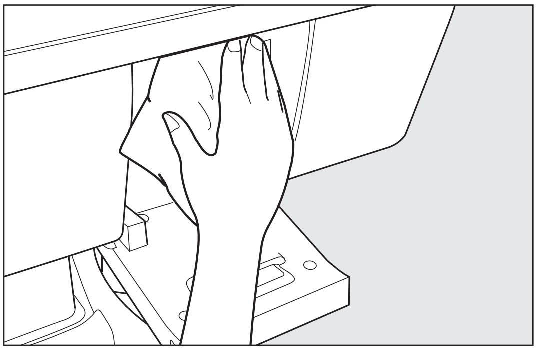
⚠WARNING

- ● The humidity chamber contains electric parts. Never immerse the humidity chamber in a disinfectant solution. Do not rub the water level sensor or the surface of the boiler of the humidity chamber with a metal brush or any other hard material. The water level sensor and the boiler surface may get damaged.



(3) Clean the inside of the humidity chamber and humidity chamber receptacle with a soft cloth dampened with a disinfectant solution.

(4) Replace the removed parts to their former positions.



⚠CAUTION

- ● Be sure to attach the boiler cap and the cartridge tank without fail.

4-5. Others

- Skin temperature probe

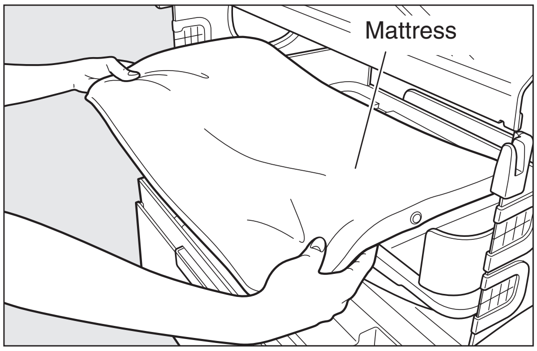
Wipe a used skin temperature probe lightly with a soft dry cloth. Wipe and disinfect the heat-sensing portion with a soft cloth dampened with a disinfectant solution.
Be sure to keep the skin temperature probe in its case.

⚠CAUTION

- ● Never clean the skin temperature probe with alcohol, or the material will harden.

- Mattress

Take out the mattress before placing another infant in the incubator. Clean the mattress with a soft cloth dampened with a disinfectant solution. Since the mattress consists of a special sponge sealed up in a vinyl cover, the sponge inside cannot be contaminated unless the cover gets damaged.



[5] Troubleshooting

✻ The description in this section relates to a unit which is equipped with a weight monitor. Please skip any reference unrelated to your unit.

5-1. Alarms

⚠WARNING

This incubator is provided with the following alarms. If an alarm condition should occur, check for a possible cause of the alarm and take the proper measures. If the incubator seems to be defective, it is in need of repairs. Indicate on the incubator that it is out of order and contact your local Atom representative.

Category	Alarm name	Message	Condition causing the alarm	The unit during the alarm condition	Resetting the alarm	Priority	Alarm silence
Temperature & Heat	MC high temperature alarm	Incubator air temperature is rising.	This alarm will occur before the incubator air temperature exceeds 38°C.	The incubator heater will be turned off.	The alarm will be reset automatically when the incubator air temperature falls below 37°C.	Medium	10 min.
	MC (override mode) or SC high temperature alarm	Incubator air temperature is rising.	This alarm will occur before the incubator air temperature exceeds 40°C.	The incubator heater will be turned off.	The alarm will be reset automatically when the incubator air temperature falls below 38°C.	Medium	10 min.
	Set temperature alarm (MC±3°C)	Incubator air temperature deviates from the set temperature.	This alarm will occur if the incubator air temperature deviates from the set temperature by 3°C or more✻2.	Temperature control will be continued.	The alarm will be reset automatically when the deviation is maintained within 3°C.	Low	15 min.
	Set temperature alarm (SC±1°C)	Skin temperature deviates from the set temperature.	This alarm will occur if the skin temperature1 deviates from the set temperature by 1°C or more✻2.	Temperature control will be continued.	The alarm will be reset automatically when the deviation is maintained within 1°C.	Low	15 min.
	Set heat alarm (MC)	Skin temperature is rising.	This alarm will occur if the skin temperature1 exceeds 40°C when the skin temperature is being monitored in the radiant warmer MC mode.	The radiant warmer heater will be turned off.	The alarm will be reset automatically when the skin temperature falls below 38°C.	High	2 min.
	Baby check alarm	Operating in manual control mode. Check the baby's condition.	This alarm will occur every 15 minutes when the heater output is more than 35% in the radiant warmer MC mode.	The radiant warmer heater will be turned off.	Touch the alarm silence switch to reset the alarm.	Low	Reset
	Skin temperature probe alarm	Abnormality in the yellow skin temperature probe.	This alarm will occur if a wire of the skin temperature 1 probe has snapped or short-circuited.✻1	The skin temperature probe will not function. (The skin temperature is not displayed.) The heater will be turned off (in the SC mode).	Remove the skin temperature probe from the infant.	Low	15 min.
	Skin temperature probe alarm (SC)	Check the connection of the yellow skin temperature probe.	This alarm will occur if the skin temperature 1 probe is not connected in the SC mode.✻1	The heater will be turned off. (SC will not function.)	The alarm will be reset automatically when the skin temperature probe is connected.	Medium	10 min.

✻1 If any disruption should occur to the skin temperature 2 probe, warning information will be given to the user.

✻2 The alarm will not occur for 30 minutes when the setting is changed.

Category	Alarm name	Message	Condition causing the alarm	The unit during the alarm condition	Resetting the alarm	Priority	Alarm silence
Humidity	Humidity chamber off alarm	Check that the humidity chamber is attached properly.	This alarm will occur if the humidity chamber is not attached.	The humidifying heater will be turned off.	The alarm will be reset automatically when the humidity chamber is attached properly or the humidity chamber cover is closed properly.	Low	15 min.
		Close the humidity chamber cover.	This alarm will occur if the humidity chamber cover is left open.	Humidity control will not start.		Low	15 min.
	No water alarm	Fill the humidity chamber with sterile distilled water.	This alarm will occur if the humidity chamber has become empty during humidity control.	The humidifying heater will be turned off.	The alarm will be reset automatically when water is supplied to the humidity chamber.	Medium	10 min.
	Humidity sensor alarm	Humidity sensor is the condensing	This alarm will occur if condensation forms on the humidity sensor.	The humidifying heater will be turned off. "– – –" will be displayed on the RH display.	The alarm will be reset automatically when the condensation on the humidity sensor disappears.	Medium	10 min.
	Humidity chamber alarm	Humidifying heater abnormal. (E8)	This alarm will occur if any disruption is detected with the humidifying heater.	The humidifying heater will be turned off.	Remove the humidifying unit.	Medium	10 min.
	Set humidity alarm	Incubator humidity deviates from the set humidity.	This alarm will occur if the relative humidity in the incubator deviates from the set humidity by 3% or more for 15 minutes.	Humidity control will be continued.	The alarm will be reset automatically when the deviation decreases to less than 3%.	Low	15 min.
	Low humidity alarm	Humidification is disabled to prevent condensation from forming.	This alarm will occur if the relative humidity in the incubator remains below the set humidity by 3% or more for at least one hour.	The humidifying heater will be turned off.	Turn humidification off, check the condition of the incubator,[4] and then turn humidification on again.	Low	15 min.
Oxygen	Oxygen sensor alarm (during calibration)	O_2 sensor (L) failed calibration.	This alarm will occur if the oxygen sensors have not been calibrated properly.		Recalibrate the oxygen sensors for a specified value. Replace the defective sensors with functional ones (calibration required).	Low	15 min.
		O_2 sensor (R) failed calibration.					
	Oxygen sensor alarm (during control)	Calibrate O_2 sensor.	This alarm will occur if the oxygen concentration detected by one sensor deviates from that detected by the other sensor by 7% or more.	Oxygen control will be continued.	Recalibrate the oxygen sensors for a specified value. Replace the defective sensors with functional ones (calibration required).	Medium	10 min.
	Oxygen concentration alarm (±3%)	Oxygen concentration in incubator deviates from the set value.	This alarm will occur if the oxygen concentration in the incubator deviates from the set oxygen concentration by 3% or more.[3]	Oxygen control will be continued.	The alarm will be reset automatically when the deviation decreases to less than 3%.	Medium	2 min.
	Oxygen flow rate alarm	No oxygen delivered.	This alarm will occur if the oxygen supply is interrupted or if oxygen has stopped flowing during oxygen control.	Oxygen control will be continued.	The alarm will be reset automatically when a normal supply of oxygen is detected.	Medium	2 min.

[3] The alarm will not occur for 40 minutes when the setting is changed.

[4] Check that all the ports and admittance panels are securely closed and that the packings are securely attached.

Category		Alarm name	Message	Condition causing the alarm	The unit during the alarm condition	Resetting the alarm	Priority	Alarm silence
Pulse	Massimo & Nellcor	SpO_2 upper limit alarm	Pulse Oximeter SpO_2 reading has exceeded upper alarm limit.	This alarm will occur if the SpO_2 upper alarm limit is exceeded.	Measurement will be continued.	The alarm will be reset automatically when the SpO_2 value falls below the upper alarm limit.	Medium	2 min.
		SpO_2 lower limit alarm	Pulse Oximeter SpO_2 reading has exceeded lower alarm limit.	This alarm will occur if the SpO_2 lower alarm limit is deviated.	Measurement will be continued.	The alarm will be reset automatically when the SpO_2 value rises above the lower alarm limit.	Medium	2 min.
		Pulse rate upper limit alarm	Pulse Oximeter Pulse rate reading has exceeded upper alarm limit.	This alarm will occur if the pulse rate upper alarm limit is exceeded.	Measurement will be continued.	The alarm will be reset automatically when the pulse rate falls below the upper alarm limit.	Medium	2 min.
		Pulse rate lower limit alarm	Pulse Oximeter Pulse rate reading has exceeded lower alarm limit.	This alarm will occur if the pulse rate lower alarm limit is deviated.	Measurement will be continued.	The alarm will be reset automatically when the pulse rate rises above the lower alarm limit.	Medium	2 min.
	Massimo	No sensor connected	Pulse Oximeter Check the patient cable connection.	This alarm will occur if the connector of the sensor cable comes off.	"– – –" will be displayed.	Touch the alarm silence switch to reset the alarm (to turn the alarm function off). The alarm will be reset automatically when the sensor cable is connected to the connector properly.	High	Reset
		Sensor off patient	Pulse Oximeter Confirm proper placement of the sensor.	This alarm will occur if the sensor attached to the patient has come off.	"– – –" will be displayed.	The alarm will be reset automatically when the sensor is attached properly.	High	2 min.
		Sensor disconnect	Pulse Oximeter Check the sensor connection.	This alarm will occur if the sensor is not connected.	"– – –" will be displayed.	The alarm will be reset automatically when the sensor is attached properly.	High	Reset
		Pulse search	Pulse Oximeter No pulse detected.	This alarm will occur when it is difficult to detect a pulse.	"– – –" will be displayed.	The alarm will be reset automatically when pulses are detected normally.	High	2 min.
		Defective sensor	Pulse Oximeter Sensor abnormal.	This alarm will occur if the sensor has become defective and cannot be recognized.	"– – –" will be displayed.	Replace the defective sensor with a functional one.	Low	–
		Defective cable	Pulse Oximeter Patient cable abnormal.	This alarm will occur if the patient cable has become defective and cannot be recognized.	"– – –" will be displayed.	Replace the defective patient cable with a functional one.	Low	–
		Internal error	Pulse Oximeter Internal system abnormal. Power cycle the incubator.	This alarm will occur if the unit has encountered a problem.	"– – –" will be displayed.	Turn the pulse function off.	Low	15 min.

Category		Alarm name	Message	Condition causing the alarm	The unit during the alarm condition	Resetting the alarm	Priority	Alarm silence
Pulse	Nellcor	Pulse search	Pulse Oximeter No pulse detected.	This alarm will occur when it is difficult to detect a pulse.	"0" or "– – –" will be displayed	The alarm will be reset automatically when pulses are detected.	High	2 min.
		Sensor disconnect	Pulse Oximeter Check the sensor connection.	This alarm will occur if the sensor is not connected (or the connector has come off).		The alarm will be reset automatically when the sensor is connected properly.	Medium	Reset
		Sensor off	Pulse Oximeter Confirm proper placement of the sensor.	This alarm will occur if the sensor attached to the patient has come off.		The alarm will be reset automatically when the sensor is attached properly.	Medium	2 min.
		Defective sensor	Pulse Oximeter Sensor abnormal.	This alarm will occur if the sensor has become defective and recognized		Replace the defective sensor with a functional one. (When the connector is removed, "Defective sensor" alarm will be replaced with "Sensor disconnect" alarm.	Medium	2 min.
		Internal error	Pulse Oximeter Internal system abnormal. Power cycle the incubator.	This alarm will occur if the unit has encountered a problem.		Turn the pulse function off.	Low	15 min.
		Communication error	Pulse Oximeter Communication abnormal. Power cycle the incubator.	This alarm will occur if the unit has encountered a problem.		Turn the pulse function off.	Low	15 min.

Category	Alarm name	Message	Condition causing the alarm	The unit during the alarm condition	Resetting the alarm	Priority	Alarm silence
Others	Canopy emergency stop alarm	The canopy is tilted. Remove obstacles.	This alarm will occur if a load is detected on the canopy when the canopy is being raised or lowered.	The canopy will be stopped midway.	Remove the load, and then raise or lower the canopy again.	Medium	10 min.
		Close the admittance panel on the feet side before lowering the canopy.	This alarm will occur if the admittance panel at the foot side is left open.		Close the admittance panel at the foot side.	Medium	10 min.
	Canopy position alarm	Make sure that switching over to the incubator or warmer mode is complete.	This alarm will occur if the canopy has been left neither fully up nor fully down for one minute or longer without being raised or lowered, except during the canopy emergency stop alarm.	The canopy will be stopped midway.	Raise or lower the canopy.	Medium	10 min.
	Sensor module position alarm	Place the sensor module back in its proper place.	This alarm will occur if the sensor module is left removed for 15 seconds or longer after calibration, or if it remains in a position other than the calibration position or the normal position for 15 seconds or longer.	The fan will continue normal operation.	Replace the sensor module to its proper position.	Medium	2 min.
	Filter cover alarm	Close the filter cover.	This alarm will occur if the filter cover is left open.	The fan will be stopped. The incubator heater will be turned off.	The alarm will be reset automatically when the filter cover is closed.	Medium	2 min.
	Fan alarm	Disconnect power and check the fan is properly attached.	This alarm will occur if the fan isn't attached properly.	The fan will continue normal operation. The incubator heater will be turned off.	Turn the power off, attach the fan properly, and then turn the power on again.	Low	15 min.
		Check the fan cover is properly attached.	This alarm will occur if the fan cover or the middle board isn't attached properly.	The fan will be stopped. The incubator heater will be turned off.	The alarm will be reset automatically when the fan cover or the middle board is attached properly.	Medium	2 min.
		Revolving speed of the fan is decreased. (E4)	This alarm will occur if the fan rotates at a lower rate than specified.	The fan will rotate at an available rate. The incubator heater will be turned off.	Impossible to reset the alarm.	Medium	10 min.

Category	Alarm name	Message	Condition causing the alarm	The unit during the alarm condition	Resetting the alarm	Priority	Alarm silence
Others	System failure alarm	Abnormality in the incubator air temperature sensor is detected. (E262)	This alarm will occur if a wire of the incubator air temperature sensor (for control) has snapped or short-circuited.	The incubator heater will be turned off.	Impossible to reset the alarm	Medium	10 min.
		Abnormality in the incubator air temperature sensor is detected. (E263)	This alarm will occur if a wire of the incubator air temperature sensor (for display) has snapped or short-circuited.	Incubator air temperature control will be continued.		Medium	10 min.
		Incubator heater abnormal. (E7)	This alarm will occur if a wire of the incubator heater has snapped.	The incubator heater will be turned off.		Medium	10 min.
		Radiant warmer heater abnormal. (E9)	This alarm will occur if a wire of the radiant warmer heater has snapped.	The radiant warmer heater will be turned off.		Medium	10 min.
	Power failure / internal error alarm	No message (The power failure alarm indicator will come on.)	This alarm will occur if the power supply is interrupted due to power failure, a disconnected power plug, a broken power cord, a tripped breaker or some other cause, or if some internal error (a defective CPU or a defective main board) has occurred.	No control All the heaters will be turned off.	Impossible to reset the alarm	High	Impossible to silence the alarm

5-2. Troubleshooting

⚠WARNING

! If the unit seems to be defective, indicate on the unit that it is out of order, stop using it immediately, and contact your local Atom representative.

⚠CAUTION

! Check the following points before requesting repair service.

Trouble	Action to take
Nothing is displayed on the display when the power switch is turned on, and the power failure alarm activates.	• Check the main power source of the incubator. (The breaker of the incubator should not be off.) • Check that the unit is connected securely to the power source. • Check the breaker of the hospital (by connecting another electric device to the power outlet used for the incubator).
Nothing is displayed on the display, and an audible alarm is given.	• Check that the display connecting cable is connected properly to the main body and the display. (Confirm that it is not inserted at an angle.)
The incubator air temperature does not rise (in the incubator mode).	• Check that the incubator air temperature is not set too low. • Check that the supply voltage is not low. (The incubator should not share a power outlet with another device.) • Check that the fan is neither damaged nor deformed. • Check that the snap-open access ports are closed. • Check that the admittance panels are closed. • Check that the tube introduction slit packings, the patient circuit slot grommets and the admittance panel packings are attached properly.
The incubator air temperature rises too high (in the incubator mode).	• Check that the incubator air temperature is not set too high. • Check that the incubator is not exposed to direct sunlight or affected by a heating apparatus nearby. • Check that the air inlet in the incubator is not blocked by obstacles such as a diaper, gauze, etc. • Check that the incubator air temperature is not set too low relative to the room temperature. • Check that a phototherapy unit is not in use.
Humidity does not rise (in the incubator mode).	• Check that the air outlets in the incubator are not blocked by obstacles such as a diaper, gauze, etc. • Check that the cartridge tank is filled with distilled water. • Check that the humidity chamber cover is closed properly. • Check that the boiler cap is fitted properly. • Check that the snap-open access ports are closed. • Check that the admittance panels are closed. • Check that the tube introduction slit packings, the patient circuit slot grommets and the admittance panel packings are attached properly.

Trouble	Action to take
Humidity rises too high (in the incubator mode).	• Check that the relative humidity is not extremely high due to the rainy season or some other cause.
The oxygen concentration does not rise (in the incubator mode).	• Check that oxygen is being supplied reliably (when the oxygen controller is in use). • Check that the flow rate is set properly on the oxygen flowmeter. • Check that the access ports are closed securely. • Check that the packings are attached securely. • Check that the filter is attached securely.
The temperature on the mattress does not rise (in the radiant warmer mode).	• Check that the heater output is not set too low. • Check that the supply voltage is not low. (The incubator should not share a power outlet with another device.) • Check that the ambient temperature is not too low. (The ambient temperature should be 20~30°C.)
The temperature on the mattress rises too high (in the radiant warmer mode).	• Check that the heater output is not set too high. • Check that the incubator is not exposed to direct sunlight or affected by a heating apparatus nearby.
The temperature on the mattress does not stabilize (in the radiant warmer mode).	• Check that the ambient temperature is not unstable. (The ambient temperature should be 20~30°C.) • Check that the incubator is not exposed to excessive drafts.
Different readings are obtained every time the infant is weighed.	• Check that the cable is not caught in the weighing section. • Check that an instrument on the mattress platform is not leaning against the inner wall of the incubator.

5-3. Troubleshooting Flowchart

5-3-1. Troubleshooting When the Unit Cannot Be Controlled Properly

Trouble	Check
The incubator air temperature does not rise (in the incubator mode).	1. Check that the incubator air temperature is not set too low. 2. Check that the unit is not installed in the current of an air-conditioner or by a cold window. Avoid installing the unit in such a place to prevent heat loss to the environment. 3. A temporary temperature drop might have been caused by opening and closing an admittance panel. Wait for a while and check the unit again. 4. Check that the supply voltage is not low. The incubator should not share a power outlet with another device. 5. Check for a fan alarm message on the display. 6. The incubator air temperature does not exceed 38°C in the manual control mode. The incubator air temperature does not exceed 40°C in the manual control (override) mode or the servo control mode.
The incubator air temperature rises too high (in the incubator mode).	1. Check that the incubator air temperature is not set too high. 2. Check that the unit is not installed in direct sunlight or near a heating apparatus. Avoid installing the unit in such a place so that it may not be affected by external thermal conditions. 3. Check that the air inlet in the unit is not blocked by a diaper, gauze, etc. 4. A temporary temperature rise might have been caused by opening and closing an admittance panel. Wait for a while and check the unit again. 5. Check that the incubator air temperature is not set too low relative to the room temperature. Set the temperature at least 3°C higher than the room temperature. 6. Check that neither a phototherapy unit nor a heating humidifier is in use. Set the temperature at least 5°C higher than the room temperature when these units are used. 7. The incubator air temperature may rise due to the heat generated by the infant itself.
Humidity does not rise (in the incubator mode).	1. Check that the relative humidity is not set too low. 2. Check for the “humidity chamber off alarm” indicator. 3. Check for the “no water alarm” indicator. 4. Check that the steam port in the unit is not blocked.
Humidity rises too high (in the incubator mode).	1. Check that the relative humidity is not set too high. 2. Check that the relative humidity in the room where the unit is installed is not extremely high.

Trouble	Check
The oxygen concentration does not rise (in the incubator mode).	1. Check that the flow rate is not set too low on the oxygen flowmeter. 2. Check that the access ports are closed securely. 3. Check that all the packings are attached securely. 4. Check that the filter is attached securely. When the oxygen controller is in use: 1. Check that the oxygen concentration is not set too low. 2. Check that oxygen is being supplied reliably at a pressure within the specified range. 3. Check that the access ports are closed securely. 4. Check that all the packings are attached securely. 5. Check that the filter is attached securely.
The oxygen concentration rises too high (in the incubator mode).	1. Check that the flow rate is not set too high on the oxygen flowmeter. When the oxygen controller is in use: 1. Check that the oxygen concentration is not set too high.
The temperature on the mattress is too high (in the radiant warmer mode).	1. Check that the heater output is not set too high. 2. Check that the unit is not exposed to direct sunlight or installed near a heating apparatus. Avoid installing the unit in such a place so that it may not be affected by external thermal conditions.
The temperature on the mattress is too low (in the radiant warmer mode).	1. Check that the heater output is not set too low. 2. Check that the unit is not installed in the current of an air-conditioner or by a cold window. Avoid installing the unit in such a place in order not to cause a heat loss to the environment. 3. Check that the supply voltage is not low. The incubator should not share a power outlet with another device.

5-3-2. Troubleshooting When the Unit Does Not Function Properly

(1) When any of the following messages is displayed on the screen:

① "Abnormality in the yellow skin temperature probe."
② "Check the connection of the yellow skin temperature probe."
③ "Check that the humidity chamber is attached properly."
④ "Close the humidity chamber cover."
⑤ "Fill the humidity chamber with sterile distilled water."
⑥ "Humidity sensor is condensing."
⑦ "Humidifying heater abnormal. (E8)"
⑧ "Incubator humidity deviates from the set humidity."
⑨ "O_2 sensor (L) failed calibration."
⑩ "O_2 sensor (R) failed calibration."
⑪ "Oxygen concentration in incubator deviates from the set value."
⑫ "No oxygen delivered."

⑬ “Pulse Oximeter: Check the patient cable connection.”

⑭ “Pulse Oximeter: Check the sensor connection.”

⑮ “Pulse Oximeter: Sensor abnormal.”

⑯ “Pulse Oximeter: Patient cable abnormal.”

⑰ “Pulse Oximeter: Internal system abnormal. Power cycle the incubator.”

⑱ “Pulse Oximeter: Communication abnormal. Power cycle the incubator.”

⑲ “Place the sensor module back in its proper place.”

⑳ “Close the filter cover.”

㉑ “Disconnect power and check the fan is properly attached.”

㉒ ”Check the fan cover is properly attached.”

㉓ “Revolving speed of the fan is decreased. (E4)”

㉔ “Abnormality in the incubator air temperature sensor is detected. (E262)”

㉕ “Abnormality in the incubator air temperature sensor is detected. (E263)”

㉖ “Incubator heater abnormal. (E7)”

㉗ “Radiant warmer heater abnormal. (E9)”

㉘ “Display Communication Fault. (E1025)”

㉙ “Internal Error. (E10)”/“Internal Error. (E13)”

㉚ “Internal Error. (E259)

㉛ “Internal Error. Power cycle the incubator. (E2)

㉜ “Set Temperature.(E1)”

㉝ “Set Humidity. (E1)”

㉞ “Set Oxygen concentration. (E1)”

㉟ “Weighing scale abnormal. (E-F0)”

(2) When no message is displayed on the screen:

① The power failure alarm indicator is flashing red.

② The display blacks out and nothing is displayed.(The screen is blank.)

③ The display does not respond when the screen is touched.

④ No audible alarm is given.

⑤ No audible alarm is given in a power failure alarm condition.

⑥ The alarm lamp on the display does not come on.

⑦ The weight screen cannot be displayed.

⑧ The clock on the display does not operate properly.

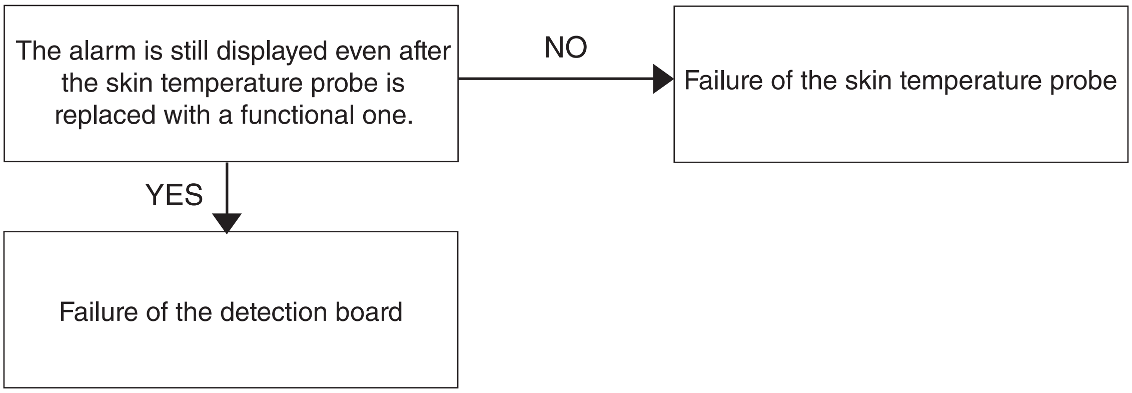
⑨ The Hi-Low stand and Table is not adjustable vertically.

⑩ The unit cannot be switched from the incubator mode to the radiant warmer mode. (The canopy and the radiant warmer do not go up.)

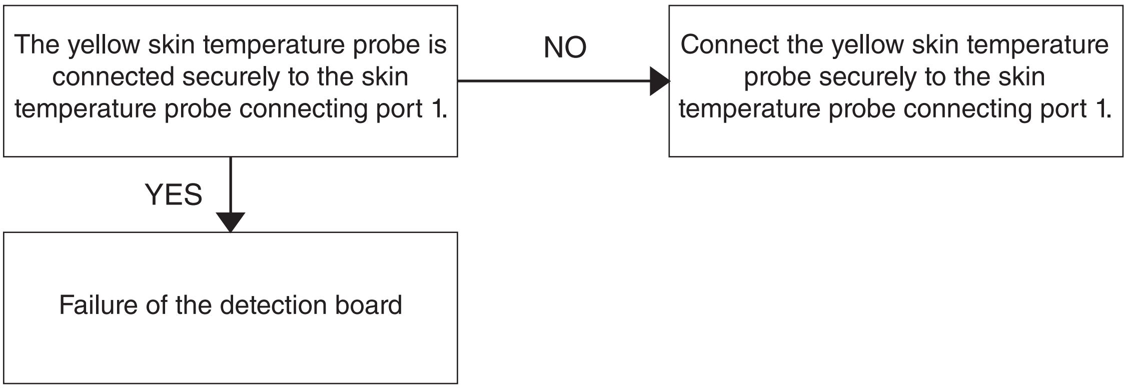
⑪ The unit cannot be switched from the radiant warmer mode to the incubator mode. (The canopy and the radiant warmer do not go down.)

(1) When any of the following messages is displayed on the screen:

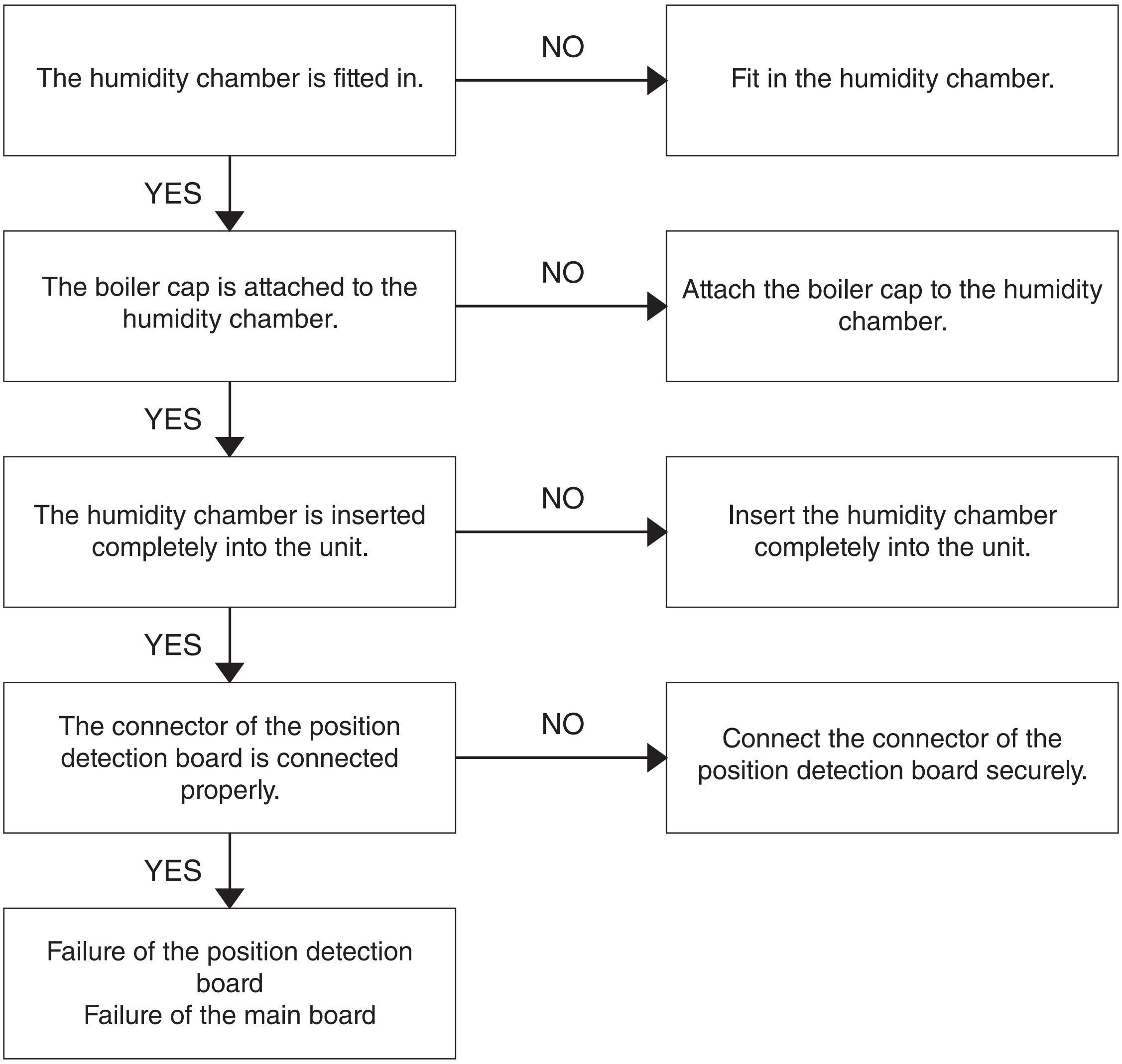
① “Abnormality in the yellow skin temperature probe.”


The alarm is still displayed even after the skin temperature probe is replaced with a functional one.
NO
Failure of the skin temperature probe
YES
Failure of the detection board

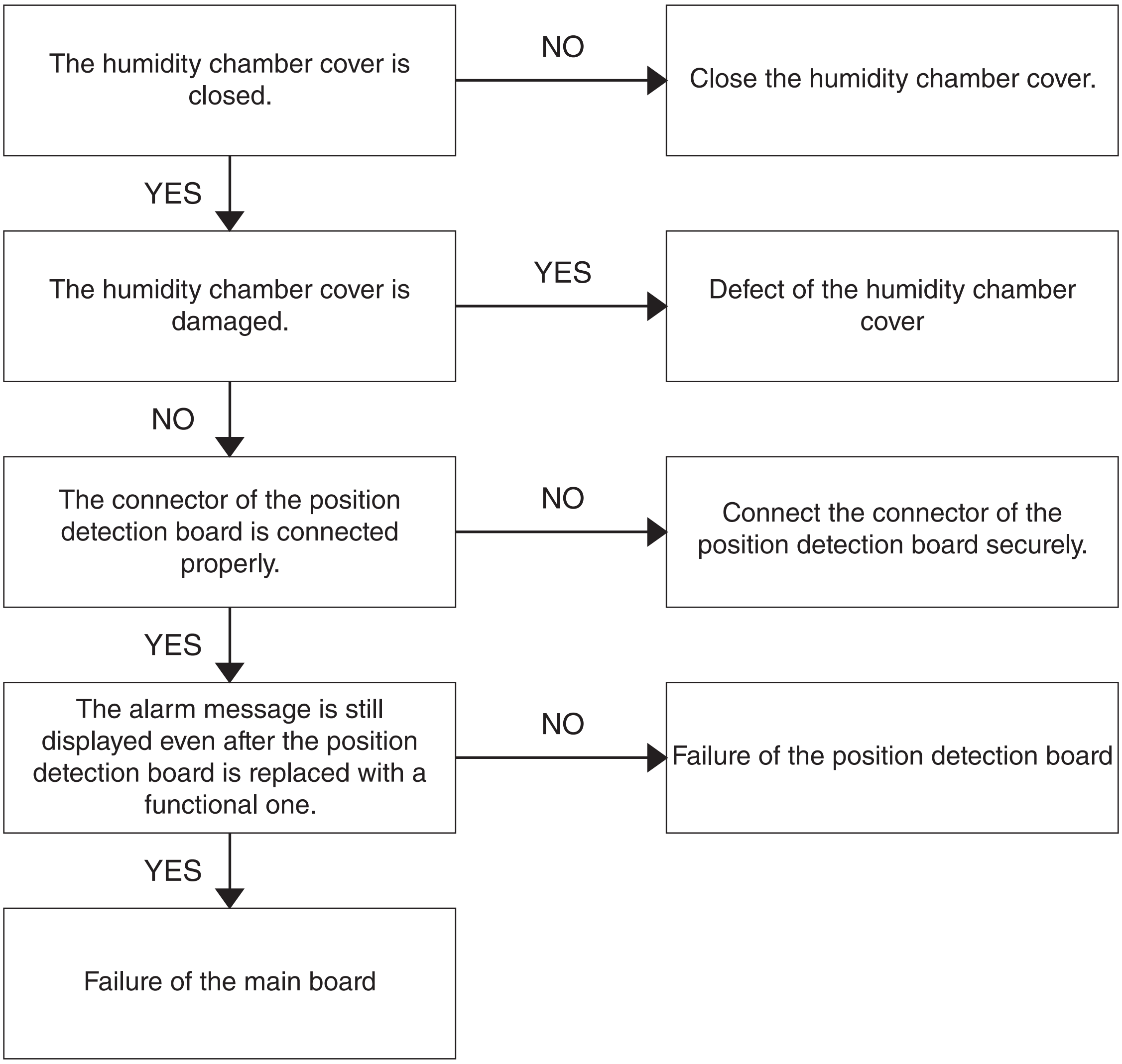
② “Check the connection of the yellow skin temperature probe.”


The yellow skin temperature probe is connected securely to the skin temperature probe connecting port 1.
NO
Connect the yellow skin temperature probe securely to the skin temperature probe connecting port 1.
YES
Failure of the detection board

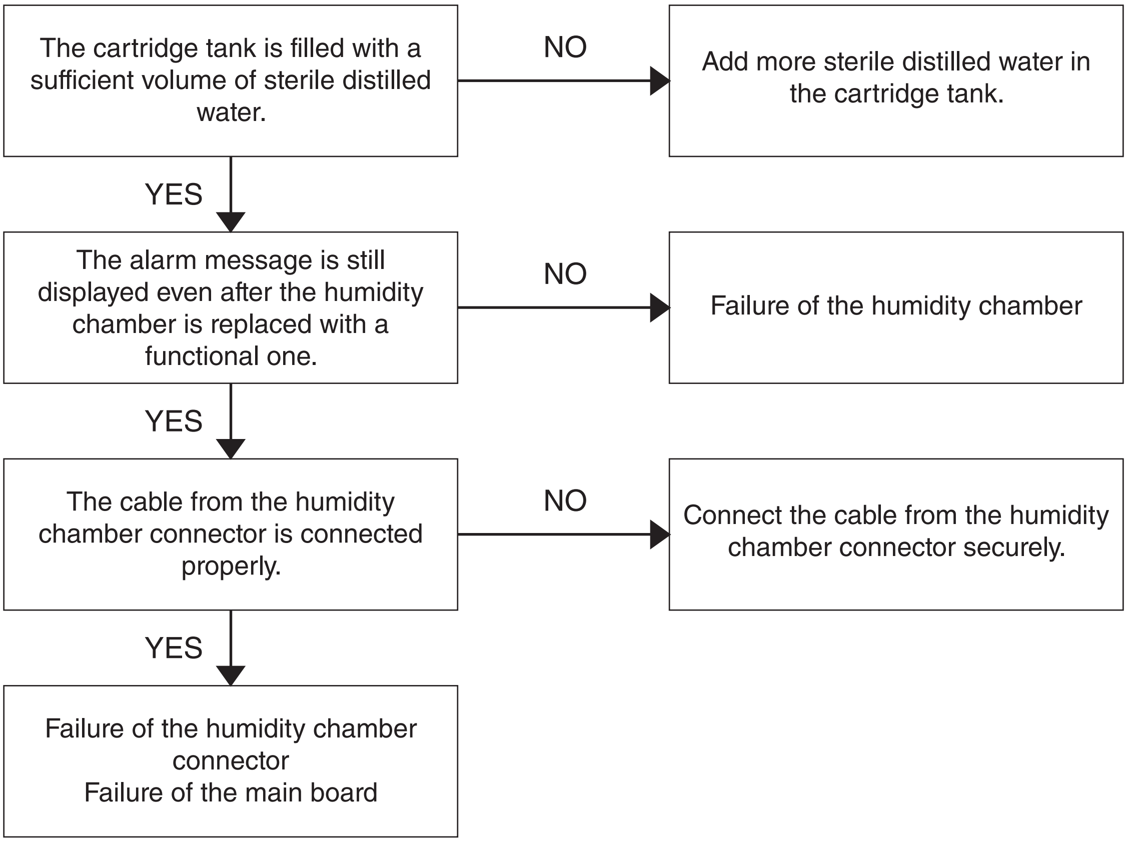
③ “Check that the humidity chamber is attached properly.”


The humidity chamber is fitted in.
NO
Fit in the humidity chamber.
YES
The boiler cap is attached to the humidity chamber.
NO
Attach the boiler cap to the humidity chamber.
YES
The humidity chamber is inserted completely into the unit.
NO
Insert the humidity chamber completely into the unit.
YES
The connector of the position detection board is connected properly.
NO
Connect the connector of the position detection board securely.
YES
Failure of the position detection board
Failure of the main board

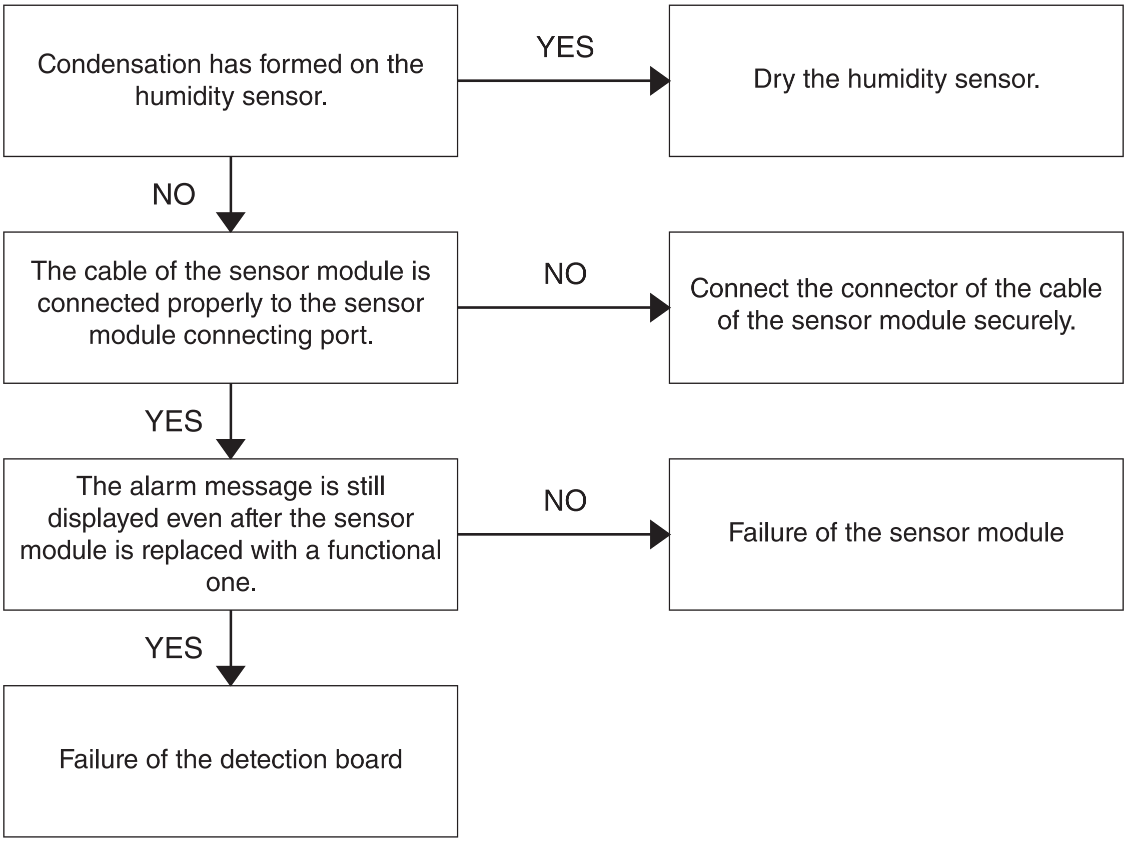
④ “Close the humidity chamber cover.”


The humidity chamber cover is closed.
NO
Close the humidity chamber cover.
YES
The humidity chamber cover is damaged.
YES
Defect of the humidity chamber cover
NO
The connector of the position detection board is connected properly.
NO
Connect the connector of the position detection board securely.
YES
The alarm message is still displayed even after the position detection board is replaced with a functional one.
NO
Failure of the position detection board
YES
Failure of the main board

⑤ “Fill the humidity chamber with sterile distilled water.”

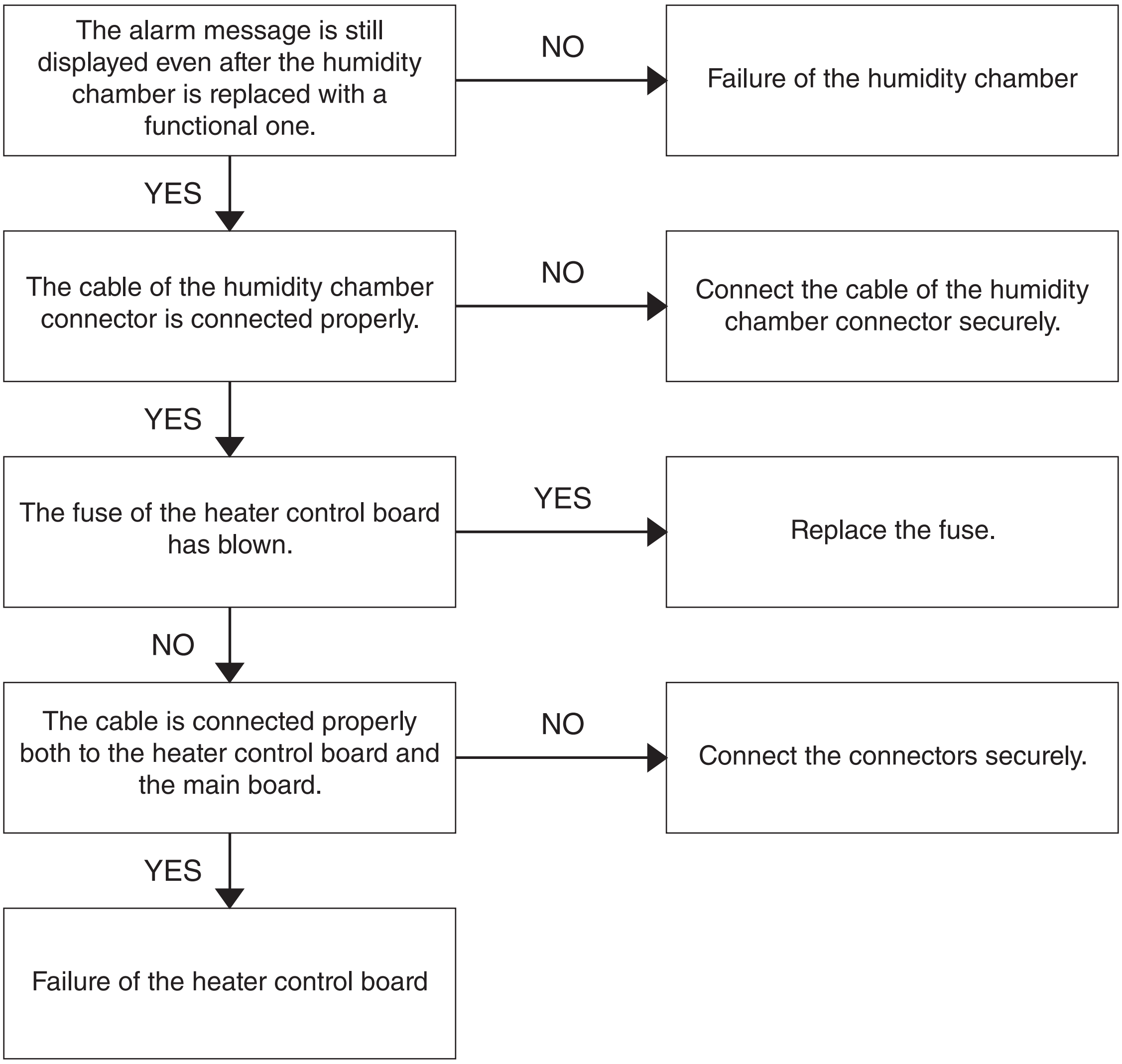

The cartridge tank is filled with a sufficient volume of sterile distilled water.
NO
Add more sterile distilled water in the cartridge tank.
YES
The alarm message is still displayed even after the humidity chamber is replaced with a functional one.
NO
Failure of the humidity chamber
YES
The cable from the humidity chamber connector is connected properly.
NO
Connect the cable from the humidity chamber connector securely.
YES
Failure of the humidity chamber connector
Failure of the main board

⑥ “Humidity sensor is condensing.”

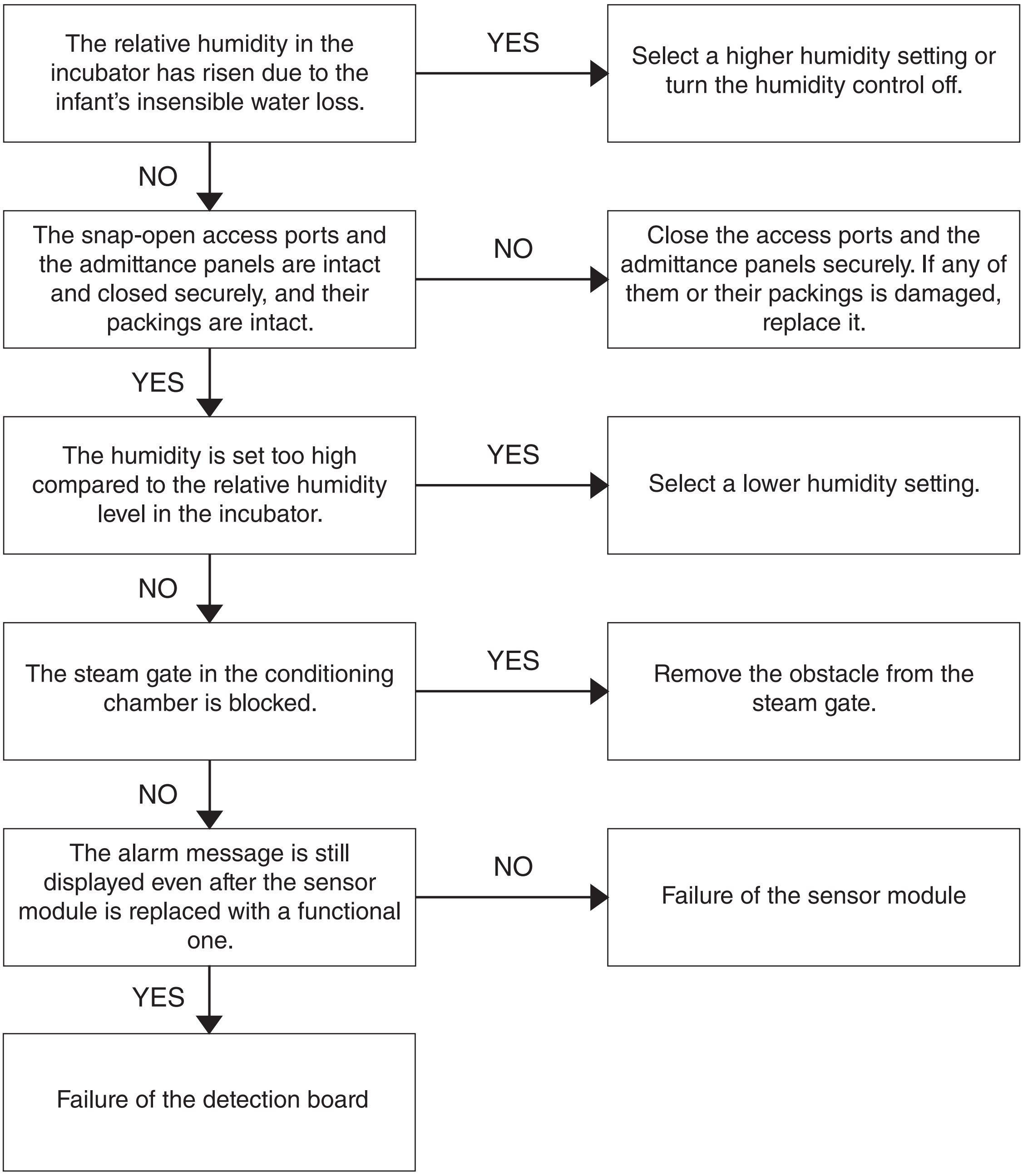

Condensation has formed on the humidity sensor.
YES
Dry the humidity sensor.
NO
The cable of the sensor module is connected properly to the sensor module connecting port.
NO
Connect the connector of the cable of the sensor module securely.
YES
The alarm message is still displayed even after the sensor module is replaced with a functional one.
NO
Failure of the sensor module
YES
Failure of the detection board

✻ Condensation may form inside the sensor module when it gets cooled rapidly after the incubator has been operated with a high humidity setting. The sensor module will return to its normal operation when the condensation disappears.

⑦ “Humidifying heater abnormal. (E8)”

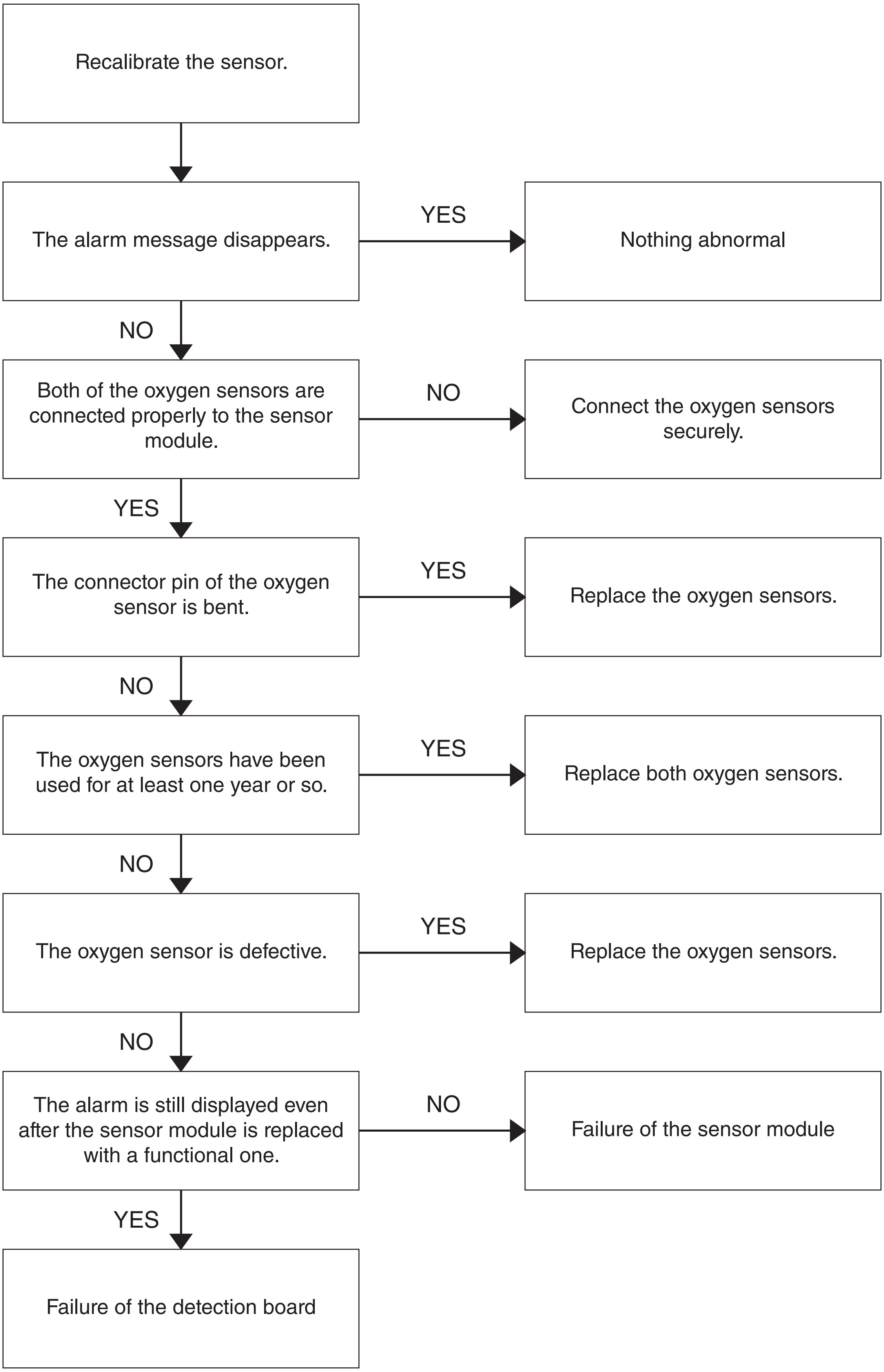

The alarm message is still displayed even after the humidity chamber is replaced with a functional one.
NO
Failure of the humidity chamber
YES
The cable of the humidity chamber connector is connected properly.
NO
Connect the cable of the humidity chamber connector securely.
YES
The fuse of the heater control board has blown.
YES
Replace the fuse.
NO
The cable is connected properly both to the heater control board and the main board.
NO
Connect the connectors securely.
YES
Failure of the heater control board

⑧ “Incubator humidity deviates from the set humidity.”

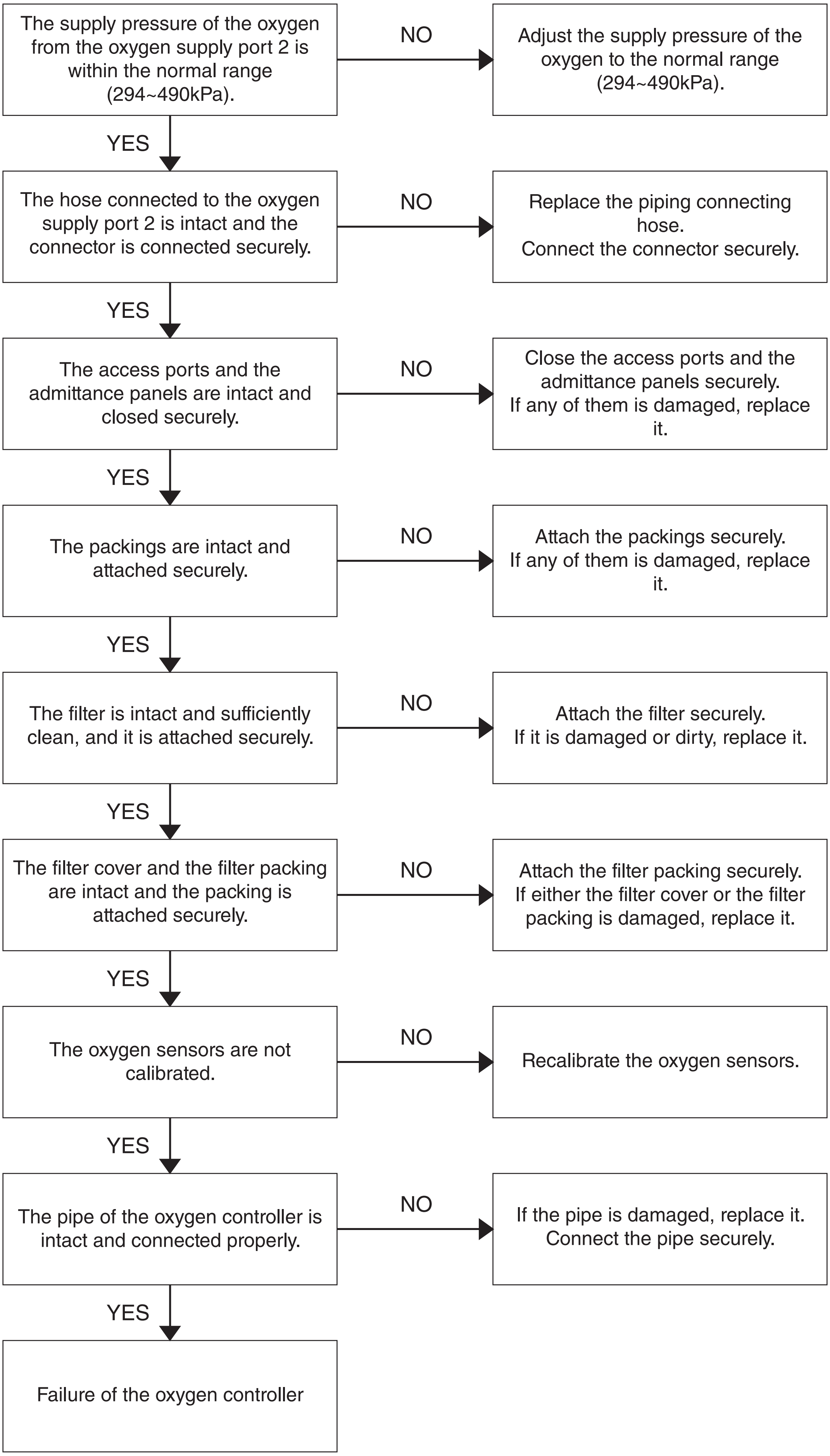

The relative humidity in the incubator has risen due to the infant’s insensible water loss.
YES
Select a higher humidity setting or turn the humidity control off.
NO
The snap-open access ports and the admittance panels are intact and closed securely, and their packings are intact.
NO
Close the access ports and the admittance panels securely. If any of them or their packings is damaged, replace it.
YES
The humidity is set too high compared to the relative humidity level in the incubator.
YES
Select a lower humidity setting.
NO
The steam gate in the conditioning chamber is blocked.
YES
Remove the obstacle from the steam gate.
NO
The alarm message is still displayed even after the sensor module is replaced with a functional one.
NO
Failure of the sensor module
YES
Failure of the detection board

⑨ “O$_2$ sensor (L) failed calibration.”

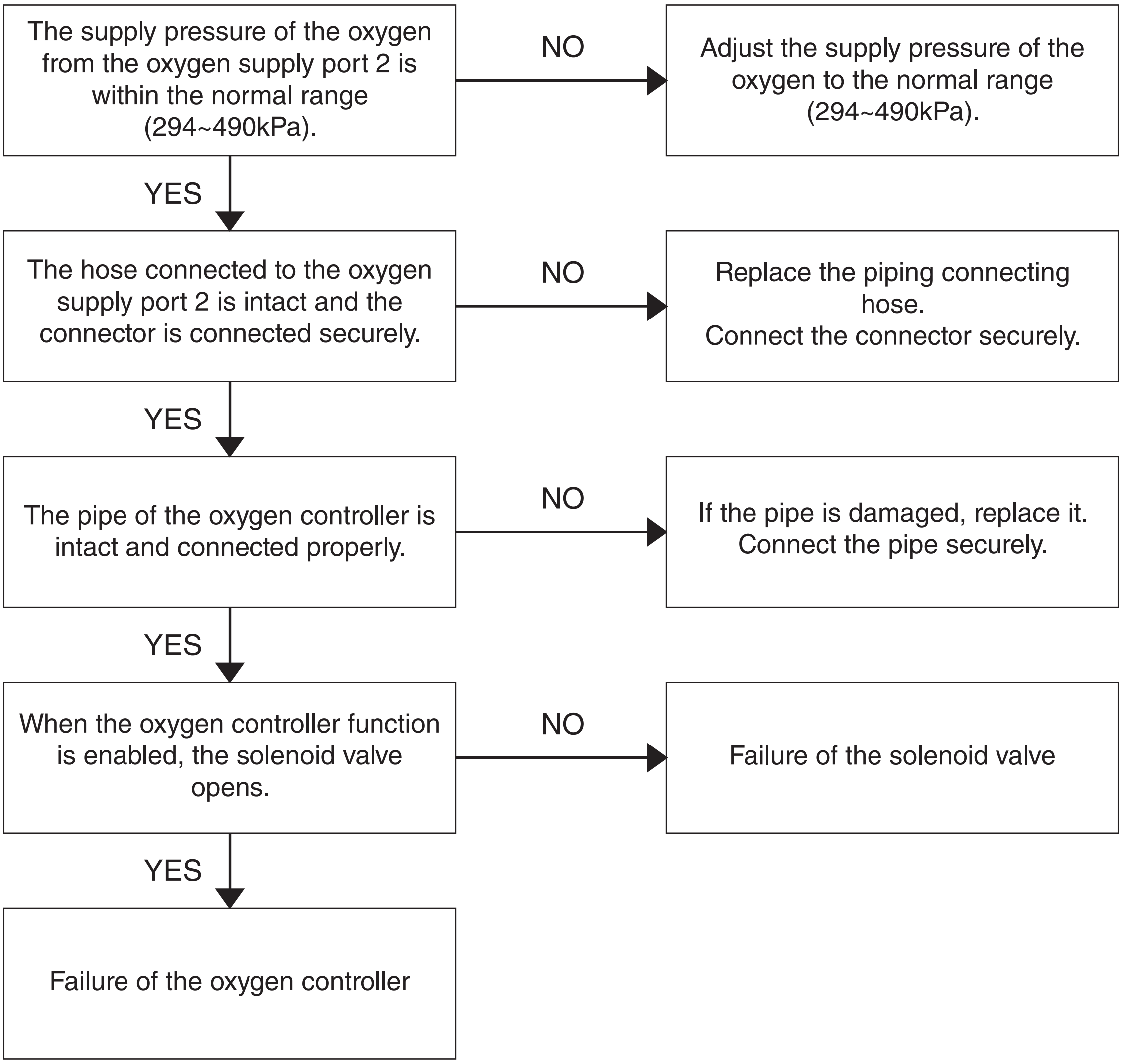
⑩ “O$_2$ sensor (R) failed calibration.”


Recalibrate the sensor.
The alarm message disappears.
YES
Nothing abnormal
NO
Both of the oxygen sensors are connected properly to the sensor module.
NO
Connect the oxygen sensors securely.
YES
The connector pin of the oxygen sensor is bent.
YES
Replace the oxygen sensors.
NO
The oxygen sensors have been used for at least one year or so.
YES
Replace both oxygen sensors.
NO
The oxygen sensor is defective.
YES
Replace the oxygen sensors.
NO
The alarm is still displayed even after the sensor module is replaced with a functional one.
NO
Failure of the sensor module
YES
Failure of the detection board

⑪ “Oxygen concentration in incubator deviates from the set value.”

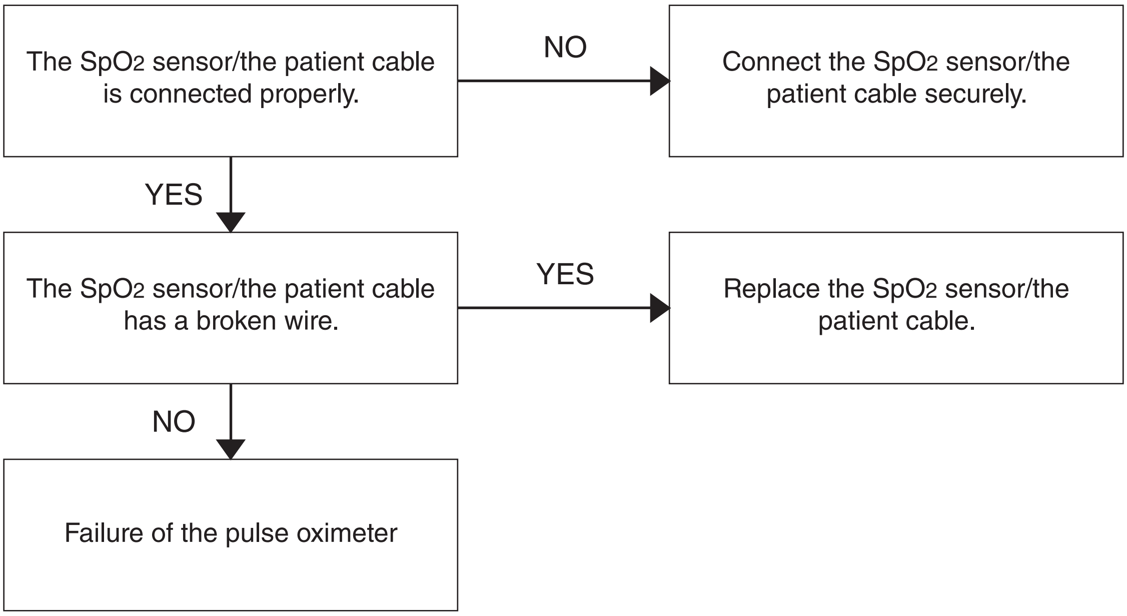

The supply pressure of the oxygen from the oxygen supply port 2 is within the normal range (294~490kPa).
NO
Adjust the supply pressure of the oxygen to the normal range (294~490kPa).
YES
The hose connected to the oxygen supply port 2 is intact and the connector is connected securely.
NO
Replace the piping connecting hose. Connect the connector securely.
YES
The access ports and the admittance panels are intact and closed securely.
NO
Close the access ports and the admittance panels securely. If any of them is damaged, replace it.
YES
The packings are intact and attached securely.
NO
Attach the packings securely. If any of them is damaged, replace it.
YES
The filter is intact and sufficiently clean, and it is attached securely.
NO
Attach the filter securely. If it is damaged or dirty, replace it.
YES
The filter cover and the filter packing are intact and the packing is attached securely.
NO
Attach the filter packing securely. If either the filter cover or the filter packing is damaged, replace it.
YES
The oxygen sensors are not calibrated.
NO
Recalibrate the oxygen sensors.
YES
The pipe of the oxygen controller is intact and connected properly.
NO
If the pipe is damaged, replace it. Connect the pipe securely.
YES
Failure of the oxygen controller

⑫ "No oxygen delivered."


The supply pressure of the oxygen from the oxygen supply port 2 is within the normal range (294~490kPa).
NO
Adjust the supply pressure of the oxygen to the normal range (294~490kPa).
YES
The hose connected to the oxygen supply port 2 is intact and the connector is connected securely.
NO
Replace the piping connecting hose.
Connect the connector securely.
YES
The pipe of the oxygen controller is intact and connected properly.
NO
If the pipe is damaged, replace it.
Connect the pipe securely.
YES
When the oxygen controller function is enabled, the solenoid valve opens.
NO
Failure of the solenoid valve
YES
Failure of the oxygen controller

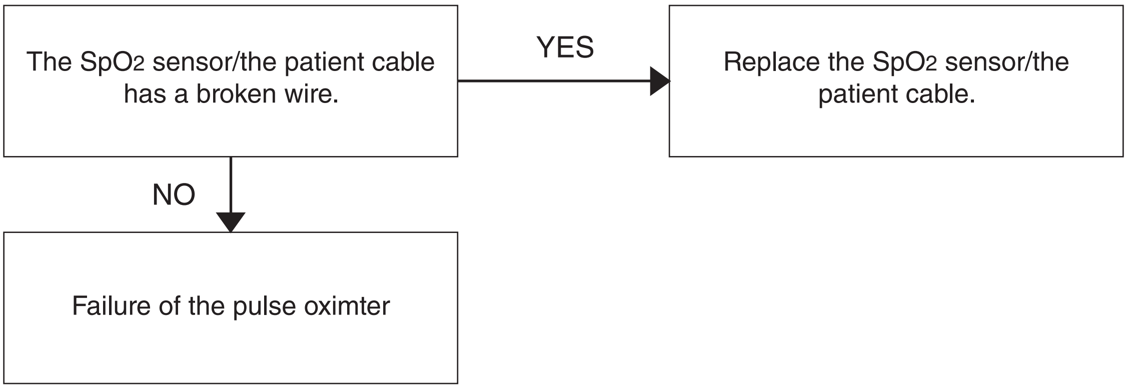
⑬ “Pulse Oximeter: Check the patient cable connection.”

⑭ “Pulse Oximeter: Check the sensor connection.”


The SpO2 sensor/the patient cable is connected properly.
NO
Connect the SpO2 sensor/the patient cable securely.
YES
The SpO2 sensor/the patient cable has a broken wire.
YES
Replace the SpO2 sensor/the patient cable.
NO
Failure of the pulse oximeter

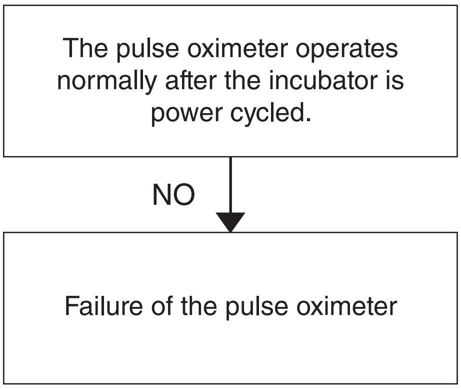
⑮ “Pulse Oximeter: Sensor abnormal.”

⑯ “Pulse Oximeter: Patient cable abnormal.”

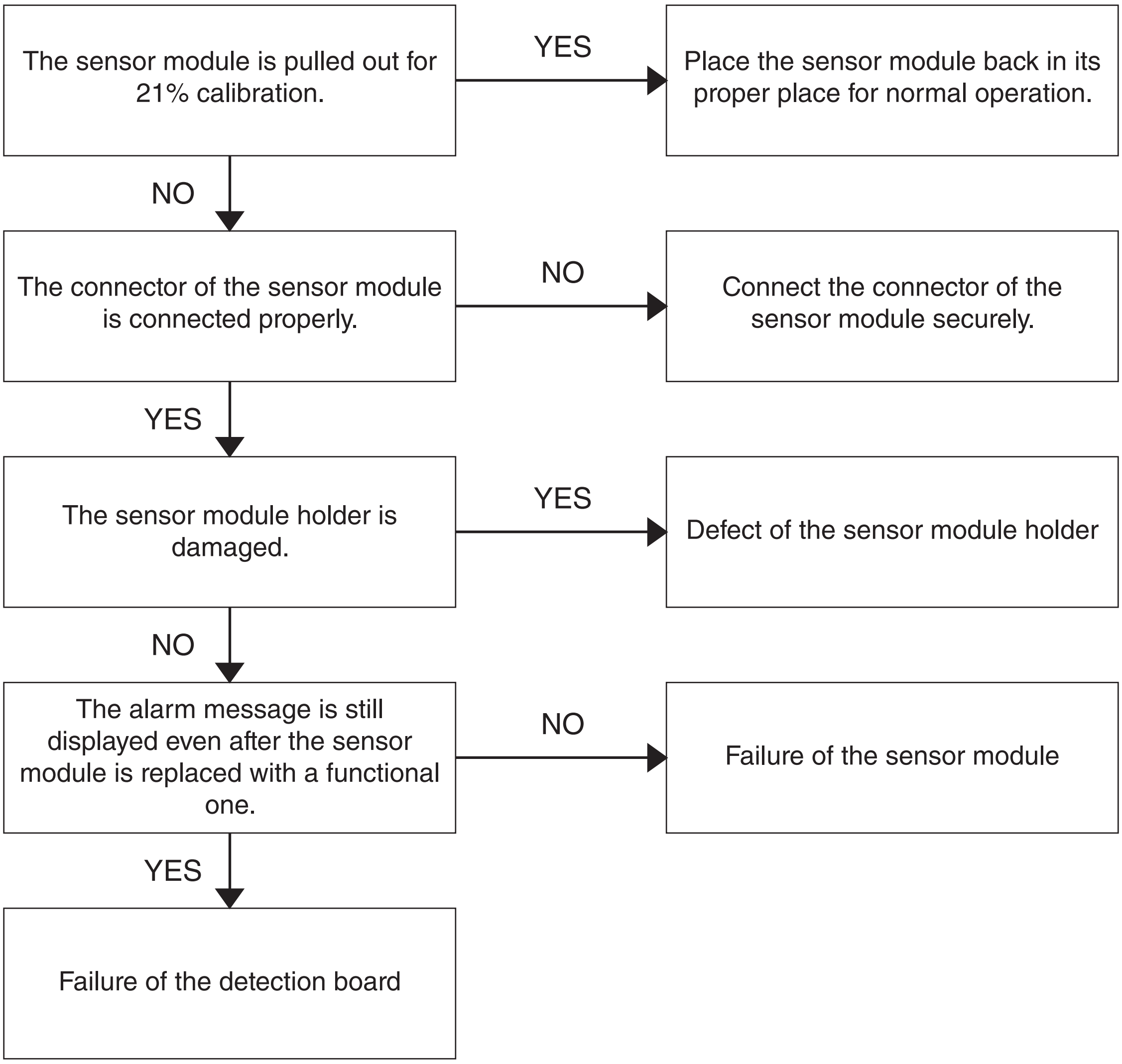

The SpO2 sensor/the patient cable has a broken wire.
YES
Replace the SpO2 sensor/the patient cable.
NO
Failure of the pulse oximter

⑰ “Pulse Oximeter: Internal system abnormal. Power cycle the incubator.”

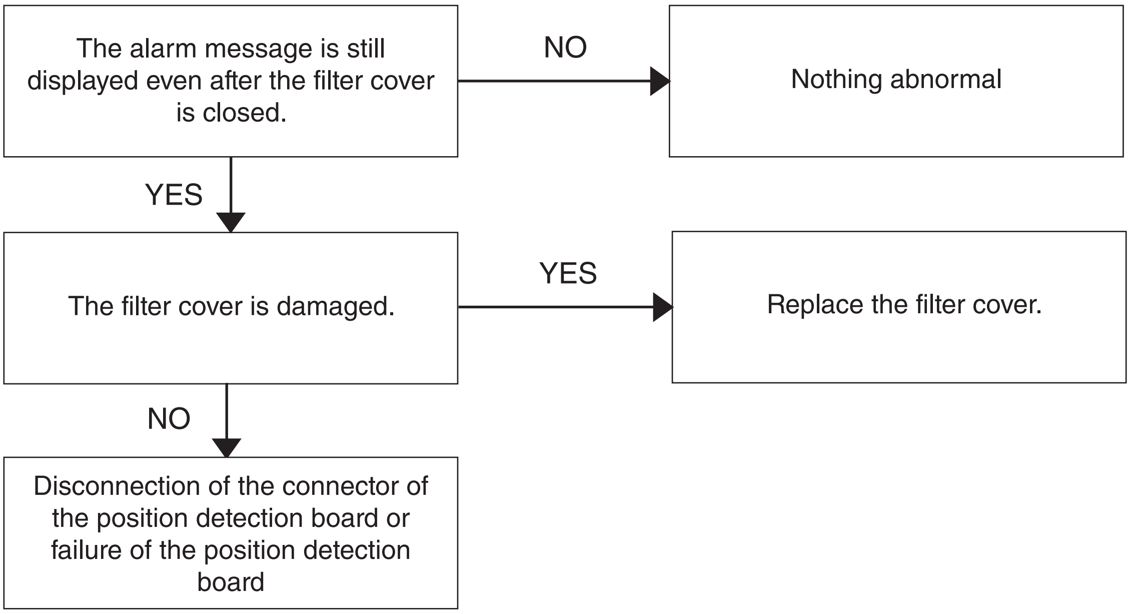
⑱ “Pulse Oximeter: Communication abnormal. Power cycle the incubator.”


The pulse oximeter operates normally after the incubator is power cycled.
NO
Failure of the pulse oximeter

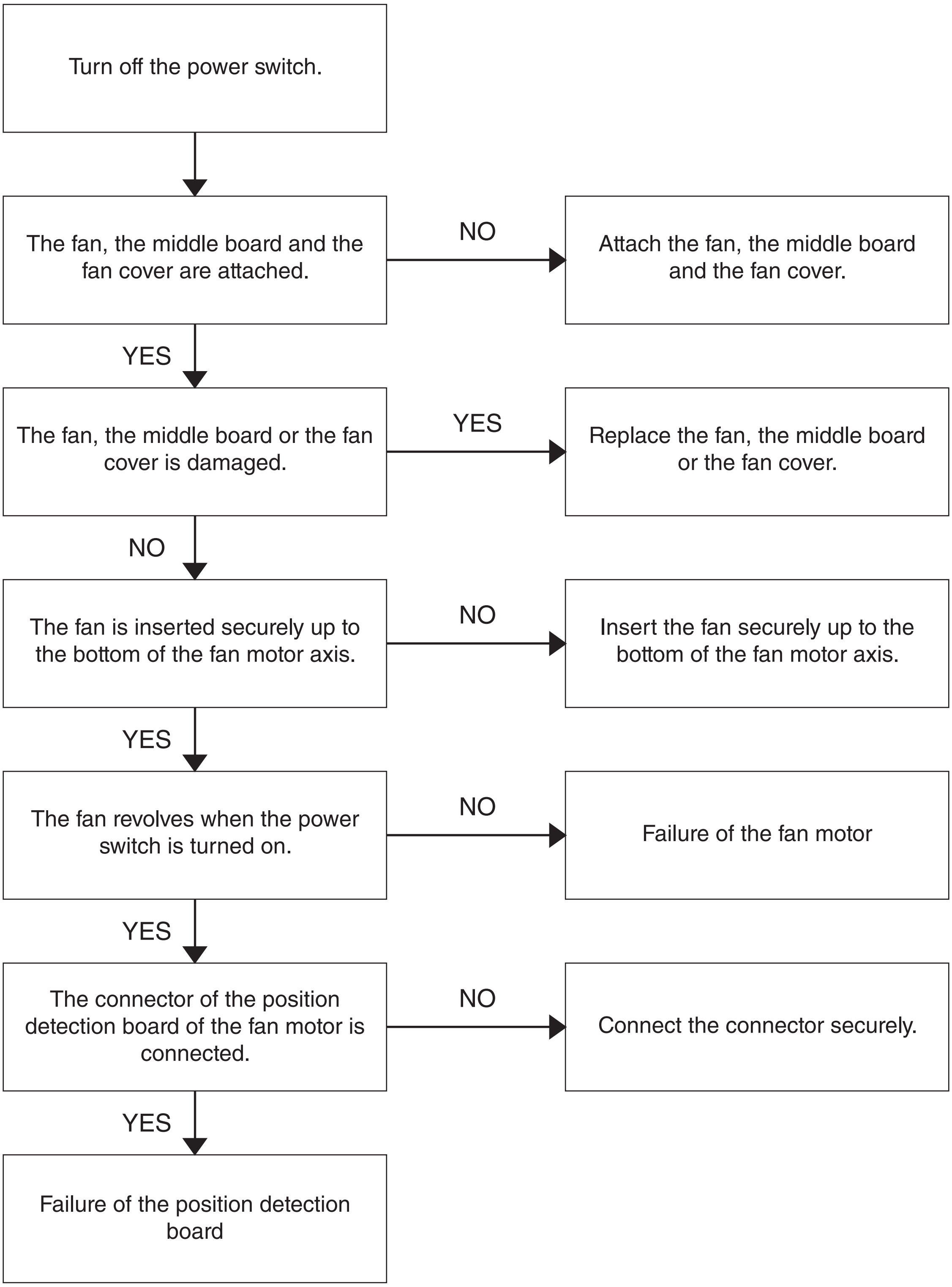
⑲ “Place the sensor module back in its proper place.”


The sensor module is pulled out for 21% calibration.
YES
Place the sensor module back in its proper place for normal operation.
NO
The connector of the sensor module is connected properly.
NO
Connect the connector of the sensor module securely.
YES
The sensor module holder is damaged.
YES
Defect of the sensor module holder
NO
The alarm message is still displayed even after the sensor module is replaced with a functional one.
NO
Failure of the sensor module
YES
Failure of the detection board

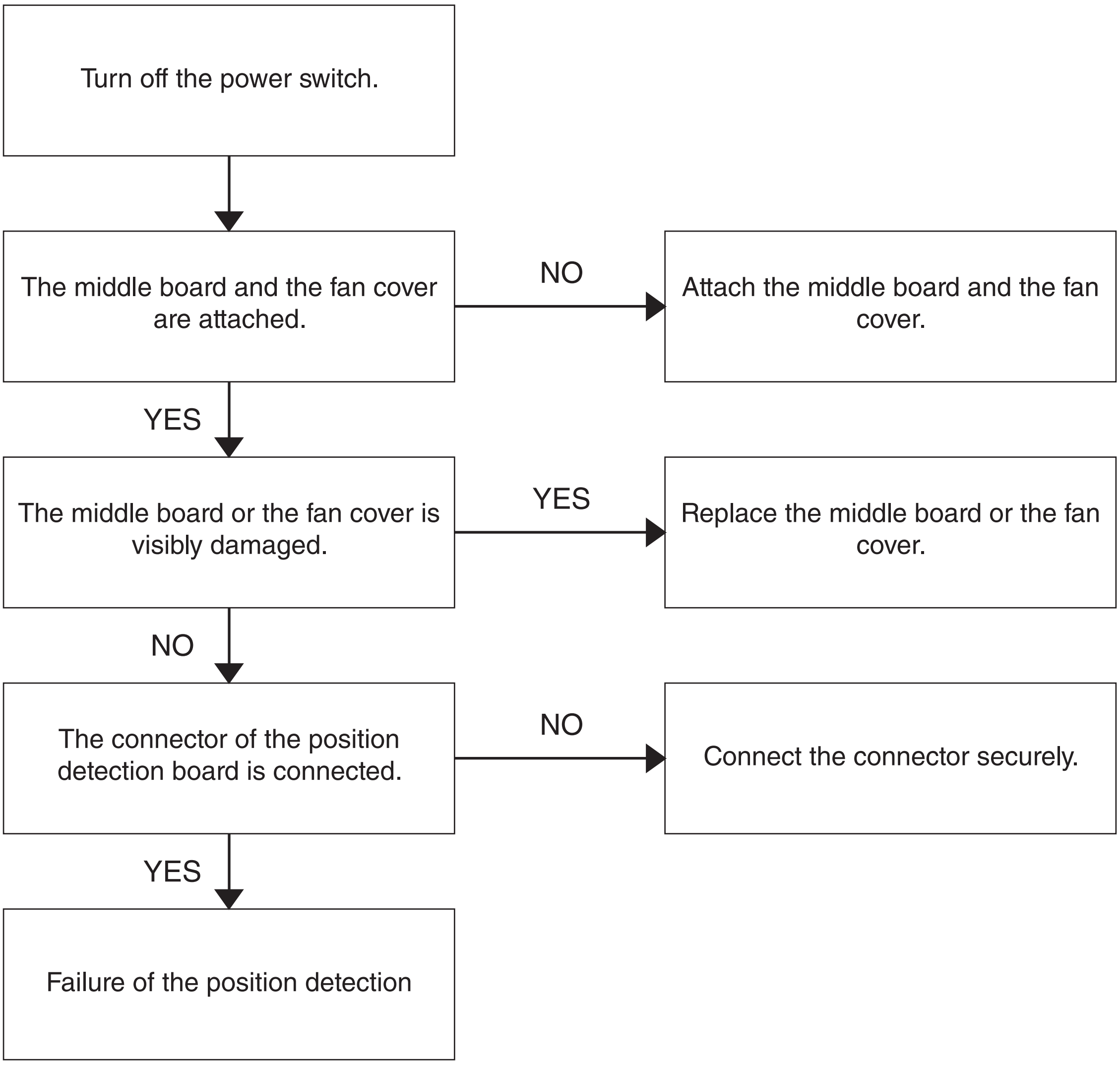
⑳ “Close the filter cover.”


The alarm message is still displayed even after the filter cover is closed.
NO
Nothing abnormal
YES
The filter cover is damaged.
YES
Replace the filter cover.
NO
Disconnection of the connector of the position detection board or failure of the position detection board

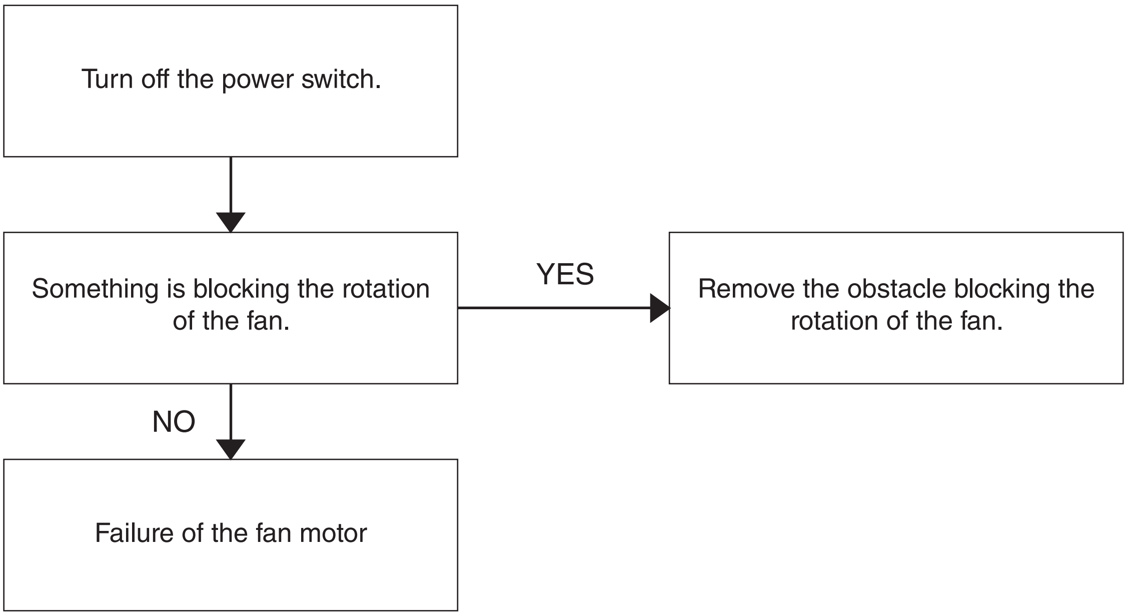
㉑ “Disconnect power and check the fan is properly attached.”


Turn off the power switch.
The fan, the middle board and the fan cover are attached.
NO
Attach the fan, the middle board and the fan cover.
YES
The fan, the middle board or the fan cover is damaged.
YES
Replace the fan, the middle board or the fan cover.
NO
The fan is inserted securely up to the bottom of the fan motor axis.
NO
Insert the fan securely up to the bottom of the fan motor axis.
YES
The fan revolves when the power switch is turned on.
NO
Failure of the fan motor
YES
The connector of the position detection board of the fan motor is connected.
NO
Connect the connector securely.
YES
Failure of the position detection board

㉒ “Check the fan cover is properly attached.”

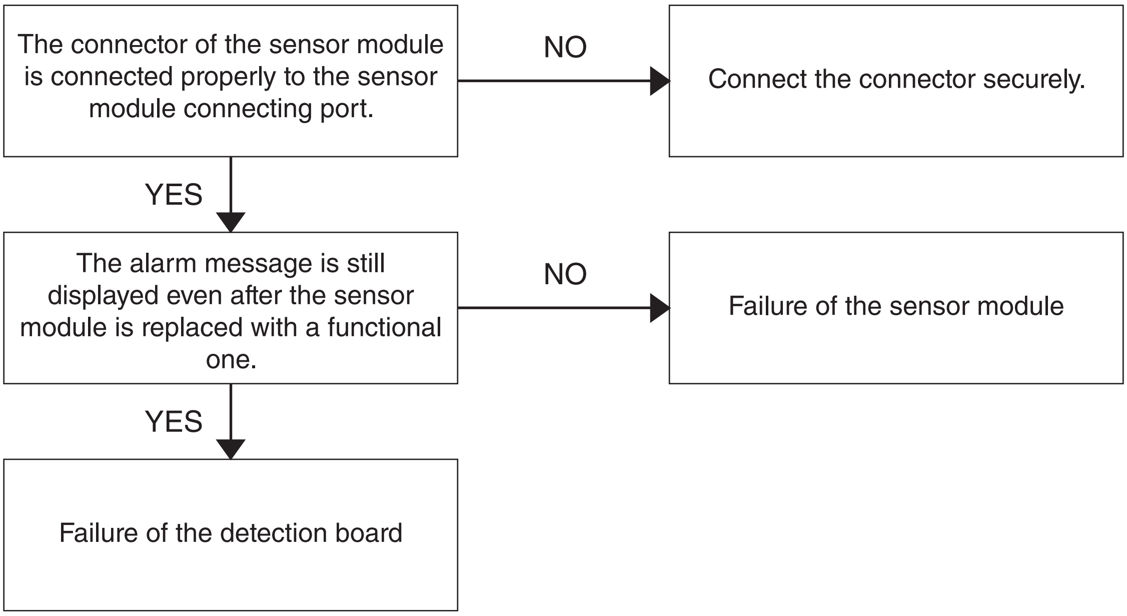

Turn off the power switch.
The middle board and the fan cover are attached.
NO
Attach the middle board and the fan cover.
YES
The middle board or the fan cover is visibly damaged.
YES
Replace the middle board or the fan cover.
NO
The connector of the position detection board is connected.
NO
Connect the connector securely.
YES
Failure of the position detection

㉓ “Revolving speed of the fan is decreased. (E4)”

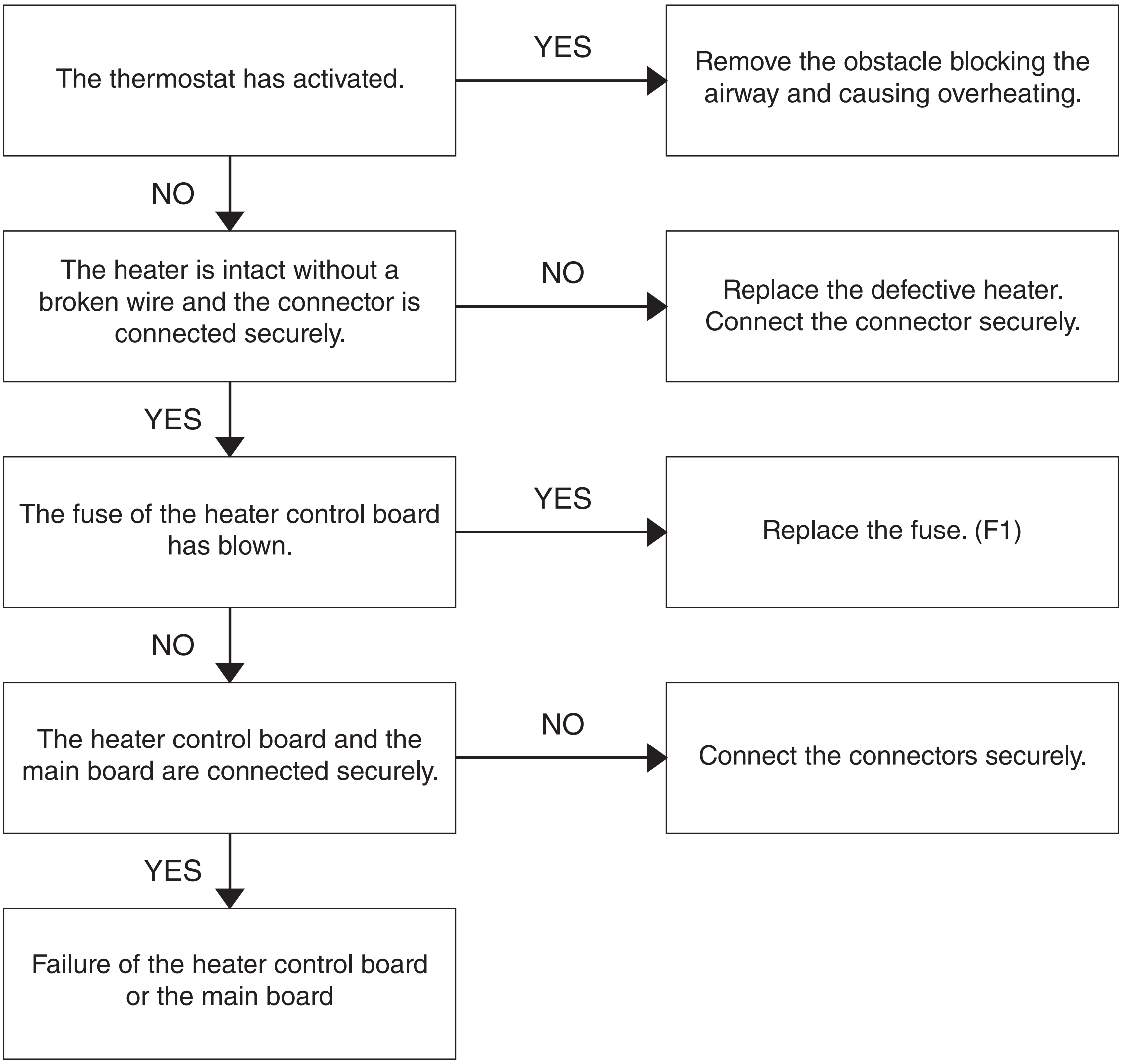

Turn off the power switch.
Something is blocking the rotation of the fan.
YES
Remove the obstacle blocking the rotation of the fan.
NO
Failure of the fan motor

㉔ "Abnormality in the incubator air temperature sensor is detected. (E262)"

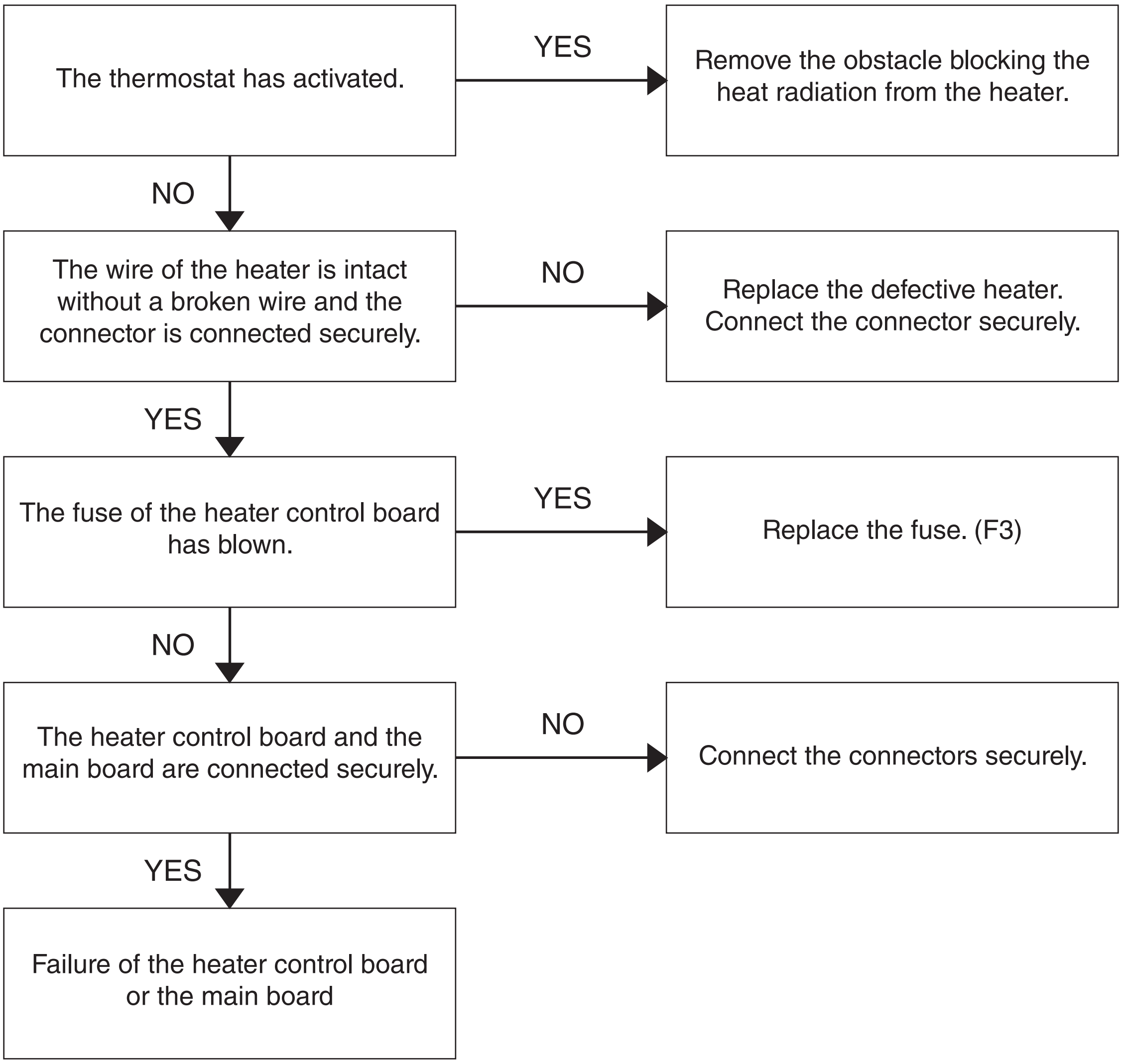
㉕ "Abnormality in the incubator air temperature sensor is detected. (E263)


The connector of the sensor module is connected properly to the sensor module connecting port.
NO
Connect the connector securely.
YES
The alarm message is still displayed even after the sensor module is replaced with a functional one.
NO
Failure of the sensor module
YES
Failure of the detection board

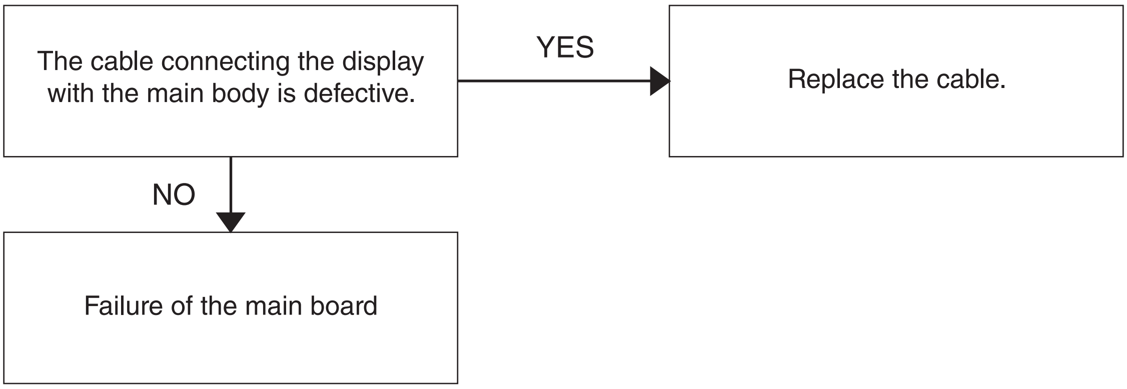
㉖ "Incubator heater abnormal. (E7)"


The thermostat has activated.
YES
Remove the obstacle blocking the airway and causing overheating.
NO
The heater is intact without a broken wire and the connector is connected securely.
NO
Replace the defective heater. Connect the connector securely.
YES
The fuse of the heater control board has blown.
YES
Replace the fuse. (F1)
NO
The heater control board and the main board are connected securely.
NO
Connect the connectors securely.
YES
Failure of the heater control board or the main board

㉗ “Radiant warmer heater abnormal. (E9)”


The thermostat has activated.
YES
Remove the obstacle blocking the heat radiation from the heater.
NO
The wire of the heater is intact without a broken wire and the connector is connected securely.
NO
Replace the defective heater. Connect the connector securely.
YES
The fuse of the heater control board has blown.
YES
Replace the fuse. (F3)
NO
The heater control board and the main board are connected securely.
NO
Connect the connectors securely.
YES
Failure of the heater control board or the main board

㉘ “Display Communication Fault. (E1025)”


The cable connecting the display with the main body is defective.
YES
Replace the cable.
NO
Failure of the main board

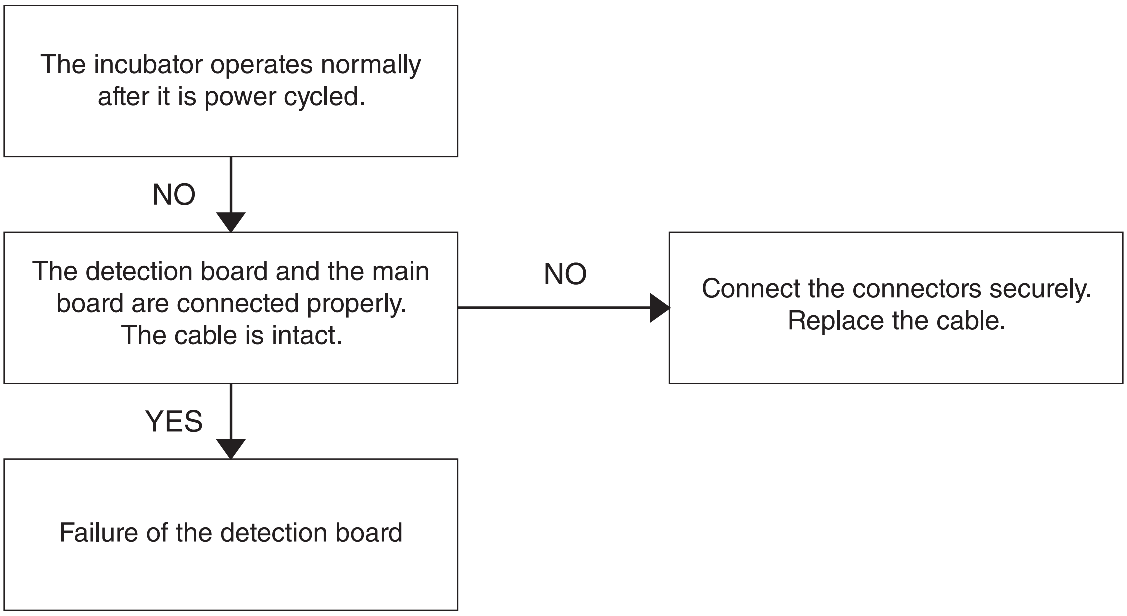
㉙ “Internal Error. (E10)”/ “Internal Error. (E13)”

Failure of the heater control board

㉚ “Internal Error. (E259)”

Failure of the detection board

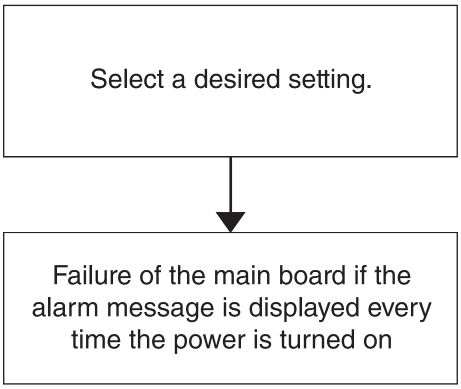
㉛ “Internal Error. Power cycle the incubator. (E2)”


The incubator operates normally after it is power cycled.
NO
The detection board and the main board are connected properly. The cable is intact.
NO
Connect the connectors securely. Replace the cable.
YES
Failure of the detection board

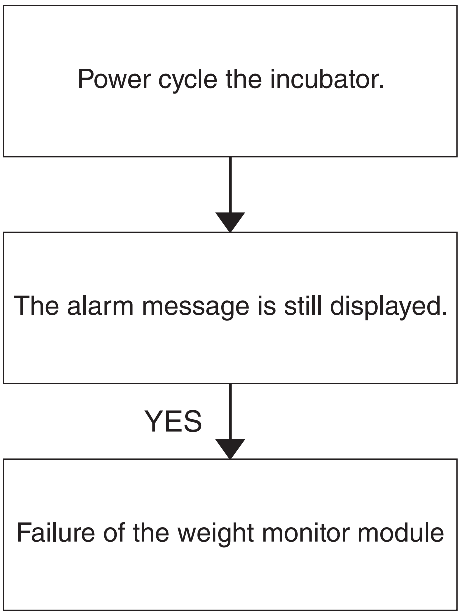
㉜ “Set Temperature. (E1)”

㉝ “Set Humidity. (E1)”

㉞ “Set Oxygen concentration. (E1)”

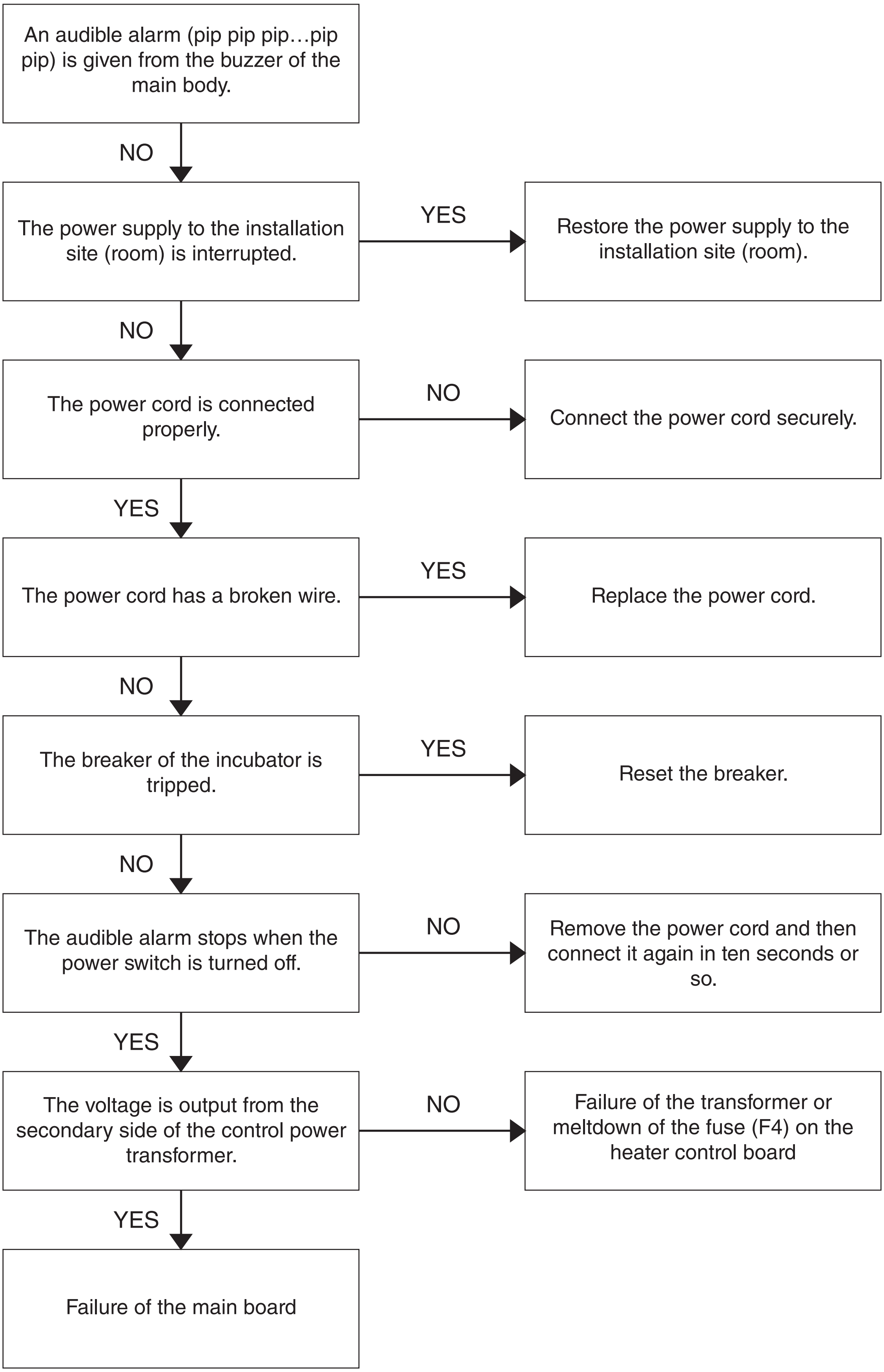

Select a desired setting.
Failure of the main board if the alarm message is displayed every time the power is turned on

㉟ “Weighing scale abnormal. (E-F0)”

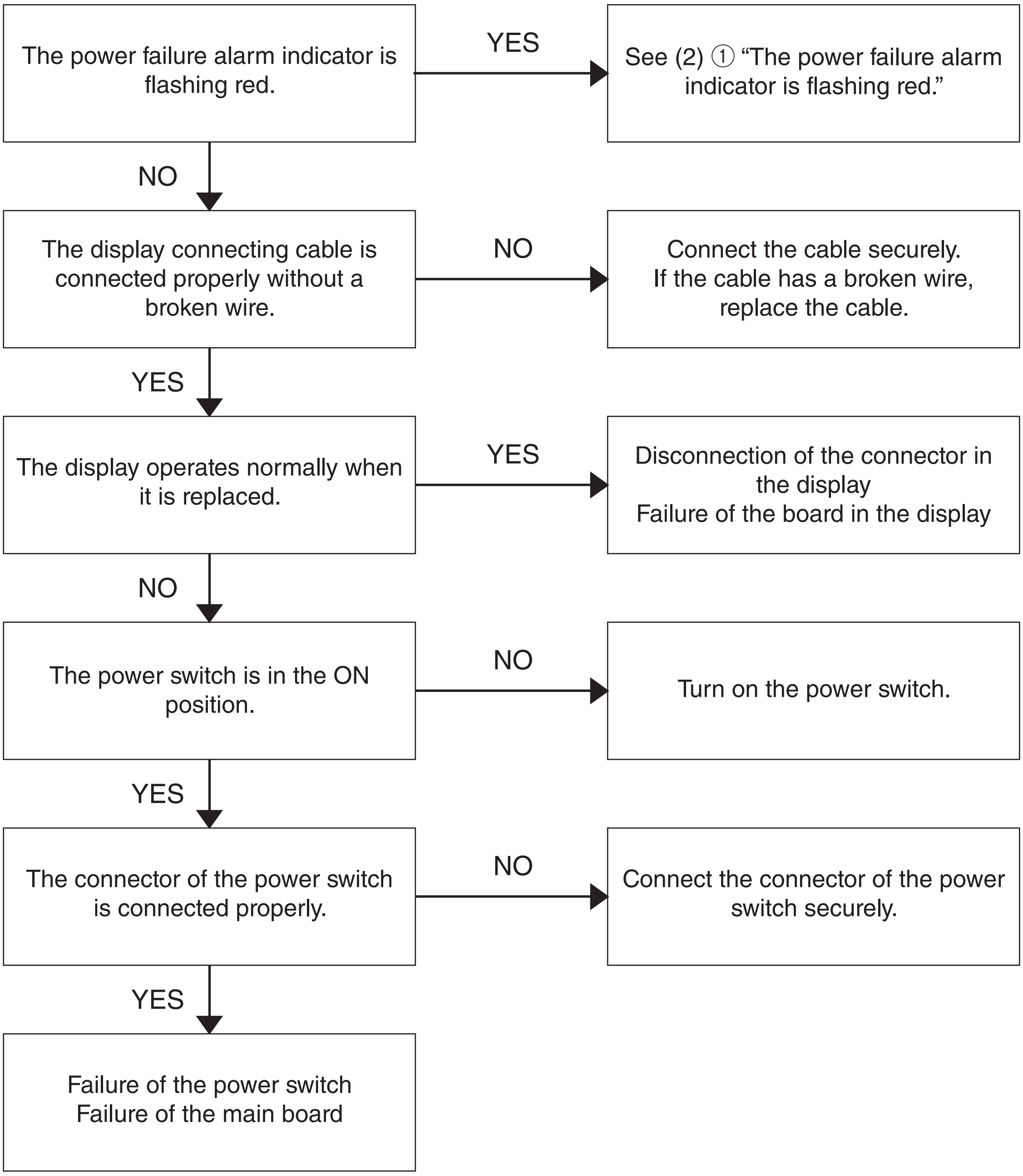

Power cycle the incubator.
The alarm message is still displayed.
YES
Failure of the weight monitor module

(2) When no message is displayed on the screen:

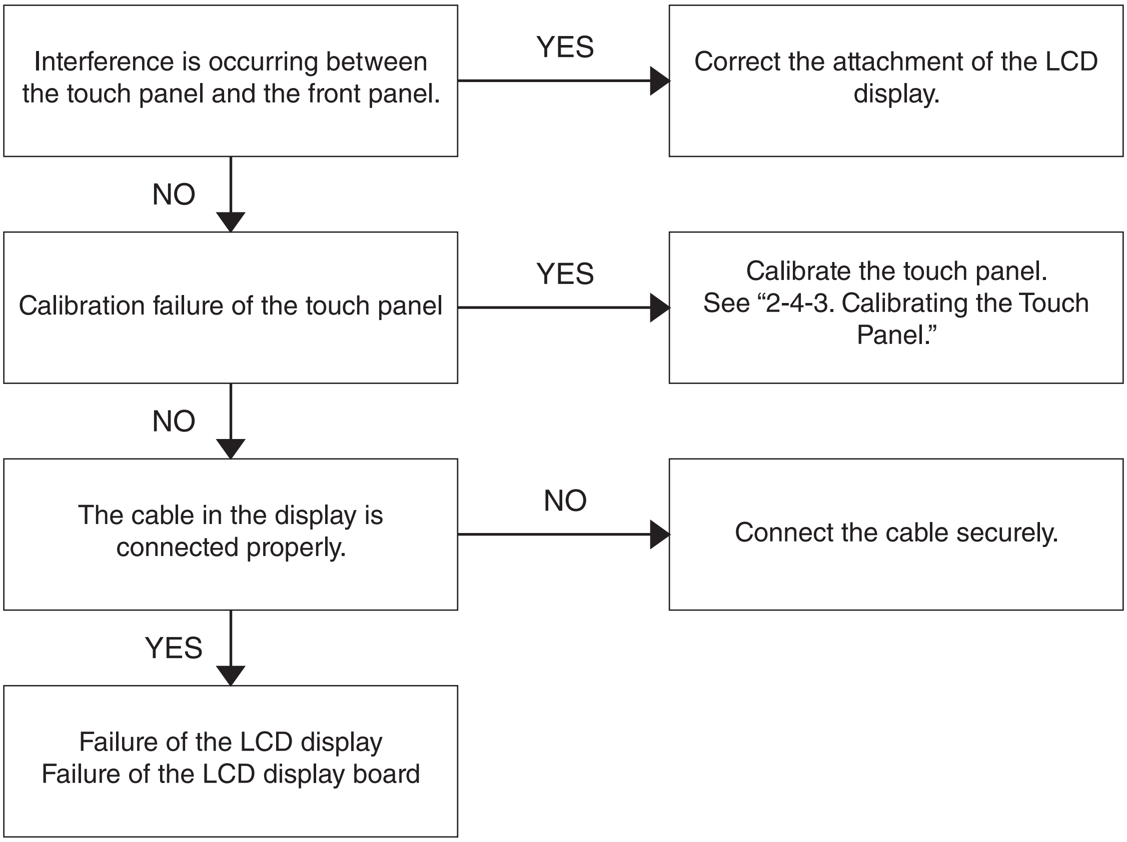
① The power failure alarm indicator is flashing red.


An audible alarm (pip pip pip…pip pip) is given from the buzzer of the main body.
NO
The power supply to the installation site (room) is interrupted.
YES
Restore the power supply to the installation site (room).
NO
The power cord is connected properly.
NO
Connect the power cord securely.
YES
The power cord has a broken wire.
YES
Replace the power cord.
NO
The breaker of the incubator is tripped.
YES
Reset the breaker.
NO
The audible alarm stops when the power switch is turned off.
NO
Remove the power cord and then connect it again in ten seconds or so.
YES
The voltage is output from the secondary side of the control power transformer.
NO
Failure of the transformer or meltdown of the fuse (F4) on the heater control board
YES
Failure of the main board

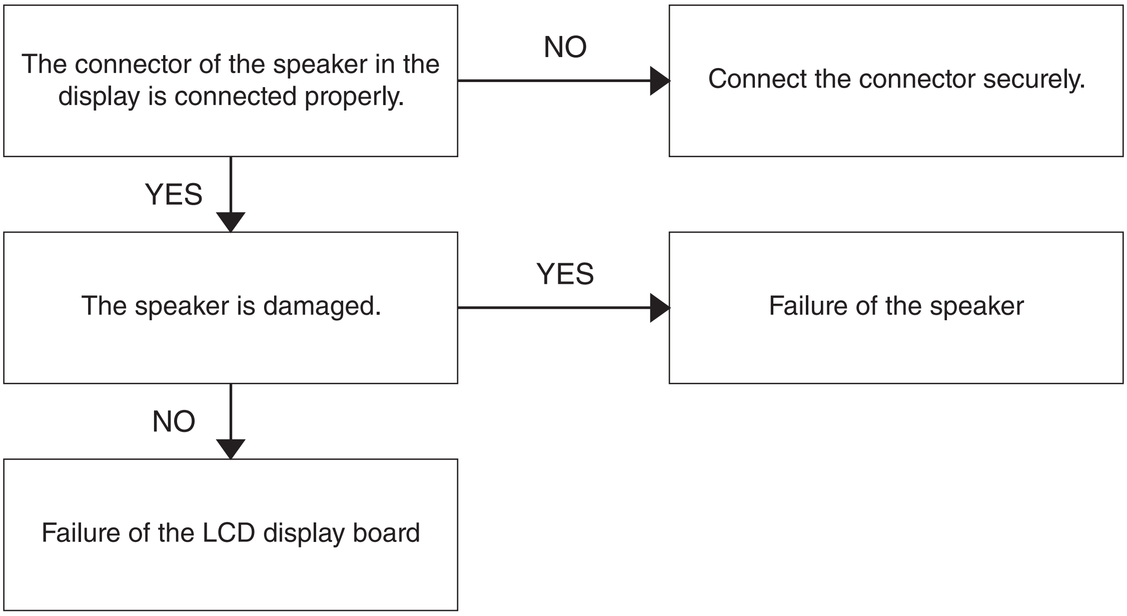
② The display blacks out and nothing is displayed. (The screen is blank.)


The power failure alarm indicator is flashing red.
YES
See (2) ① "The power failure alarm indicator is flashing red."
NO
The display connecting cable is connected properly without a broken wire.
NO
Connect the cable securely. If the cable has a broken wire, replace the cable.
YES
The display operates normally when it is replaced.
YES
Disconnection of the connector in the display
Failure of the board in the display
NO
The power switch is in the ON position.
NO
Turn on the power switch.
YES
The connector of the power switch is connected properly.
NO
Connect the connector of the power switch securely.
YES
Failure of the power switch
Failure of the main board

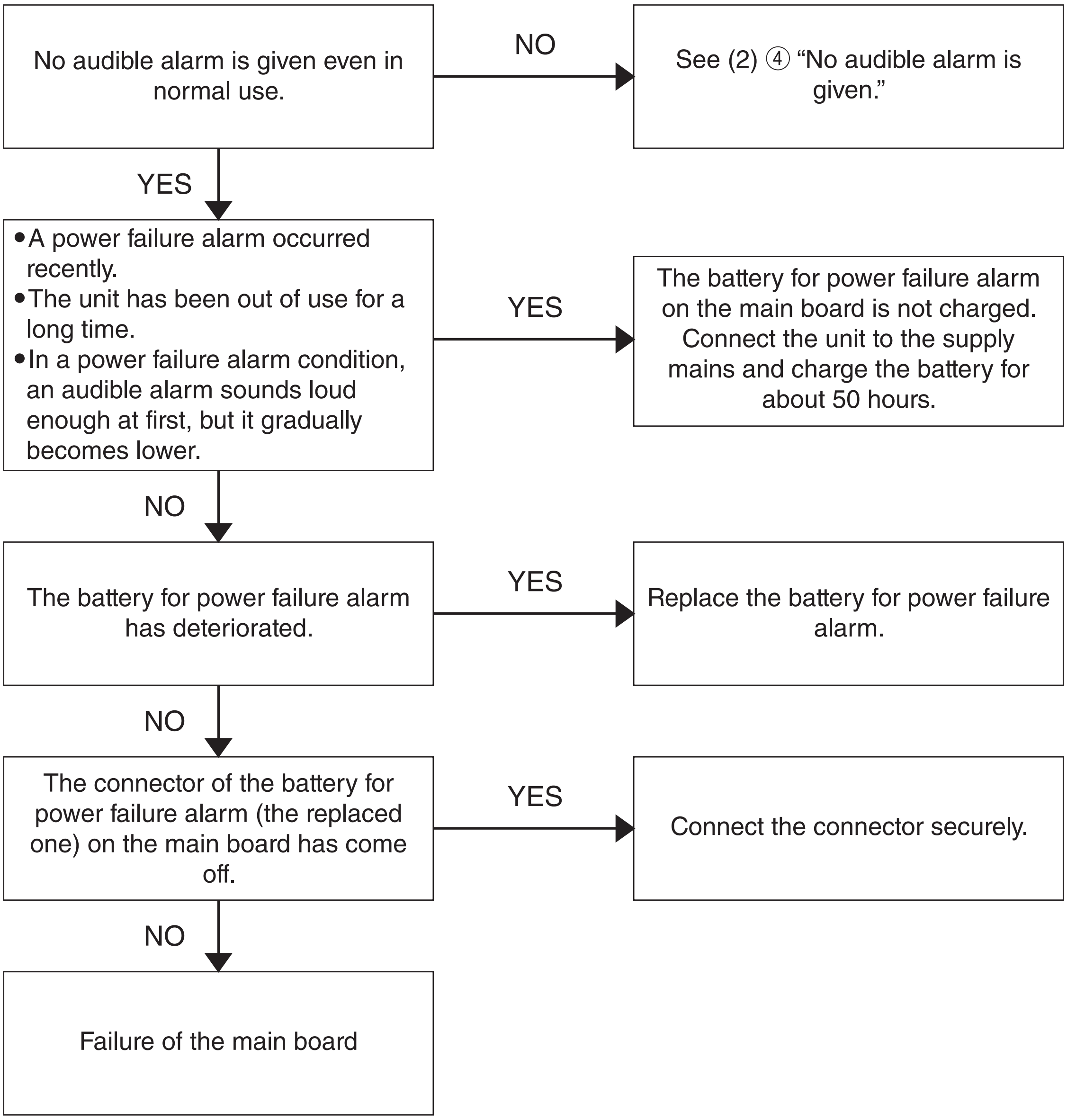
③ The display does not respond when the screen is touched.


Interference is occurring between the touch panel and the front panel.
YES
Correct the attachment of the LCD display.
NO
Calibration failure of the touch panel
YES
Calibrate the touch panel. See “2-4-3. Calibrating the Touch Panel.”
NO
The cable in the display is connected properly.
NO
Connect the cable securely.
YES
Failure of the LCD display
Failure of the LCD display board

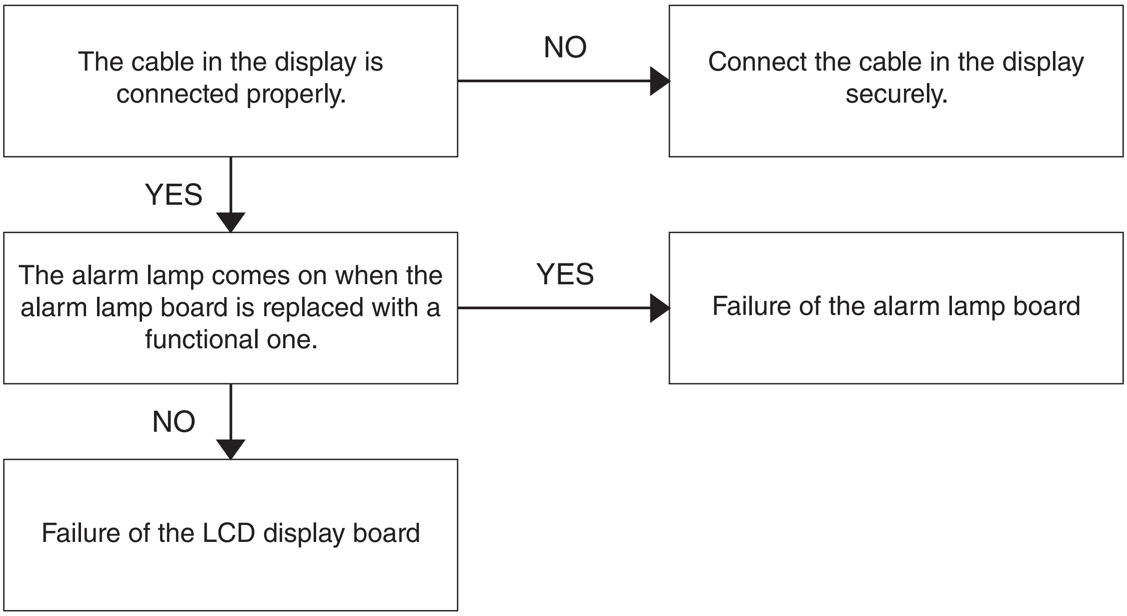
④ No audible alarm is given.


The connector of the speaker in the display is connected properly.
NO
Connect the connector securely.
YES
The speaker is damaged.
YES
Failure of the speaker
NO
Failure of the LCD display board

⑤ No audible alarm is given in a power failure alarm condition.

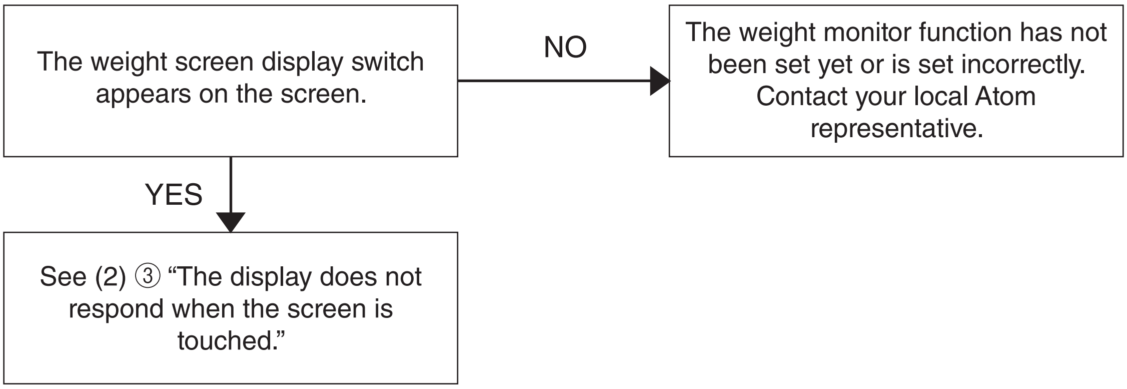

No audible alarm is given even in normal use.
NO
See (2) ④ “No audible alarm is given.”
YES
• A power failure alarm occurred recently.
• The unit has been out of use for a long time.
• In a power failure alarm condition, an audible alarm sounds loud enough at first, but it gradually becomes lower.
YES
The battery for power failure alarm on the main board is not charged. Connect the unit to the supply mains and charge the battery for about 50 hours.
NO
The battery for power failure alarm has deteriorated.
YES
Replace the battery for power failure alarm.
NO
The connector of the battery for power failure alarm (the replaced one) on the main board has come off.
YES
Connect the connector securely.
NO
Failure of the main board

⑥ The alarm lamp on the display does not come on.

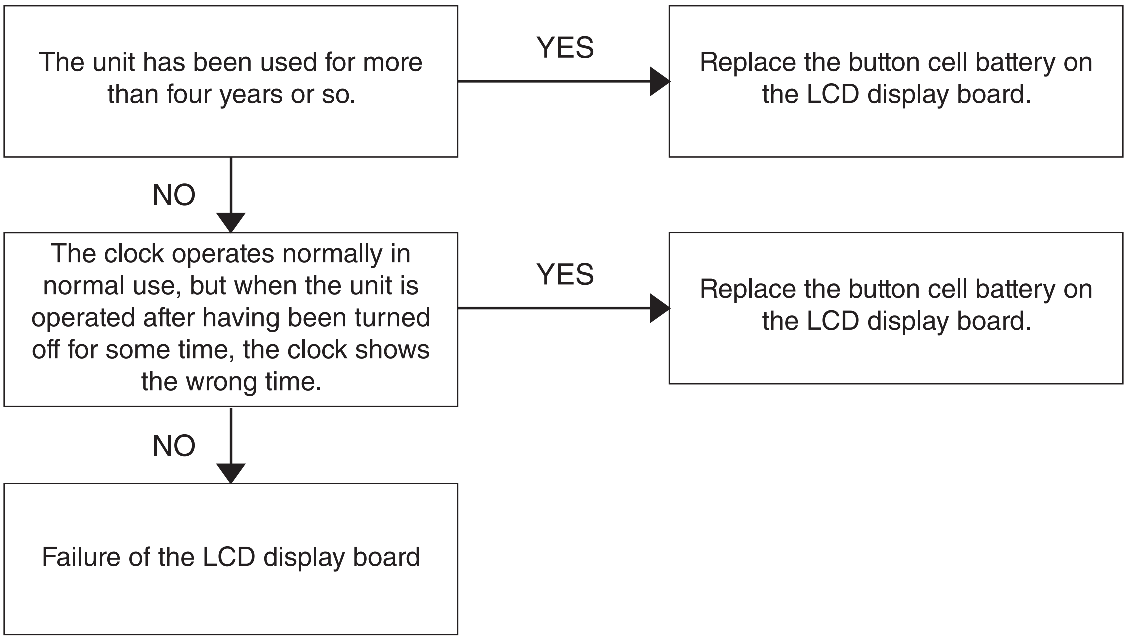

The cable in the display is connected properly.
NO
Connect the cable in the display securely.
YES
The alarm lamp comes on when the alarm lamp board is replaced with a functional one.
YES
Failure of the alarm lamp board
NO
Failure of the LCD display board

✻ The alarm lamp comes on only in a high priority alarm condition.

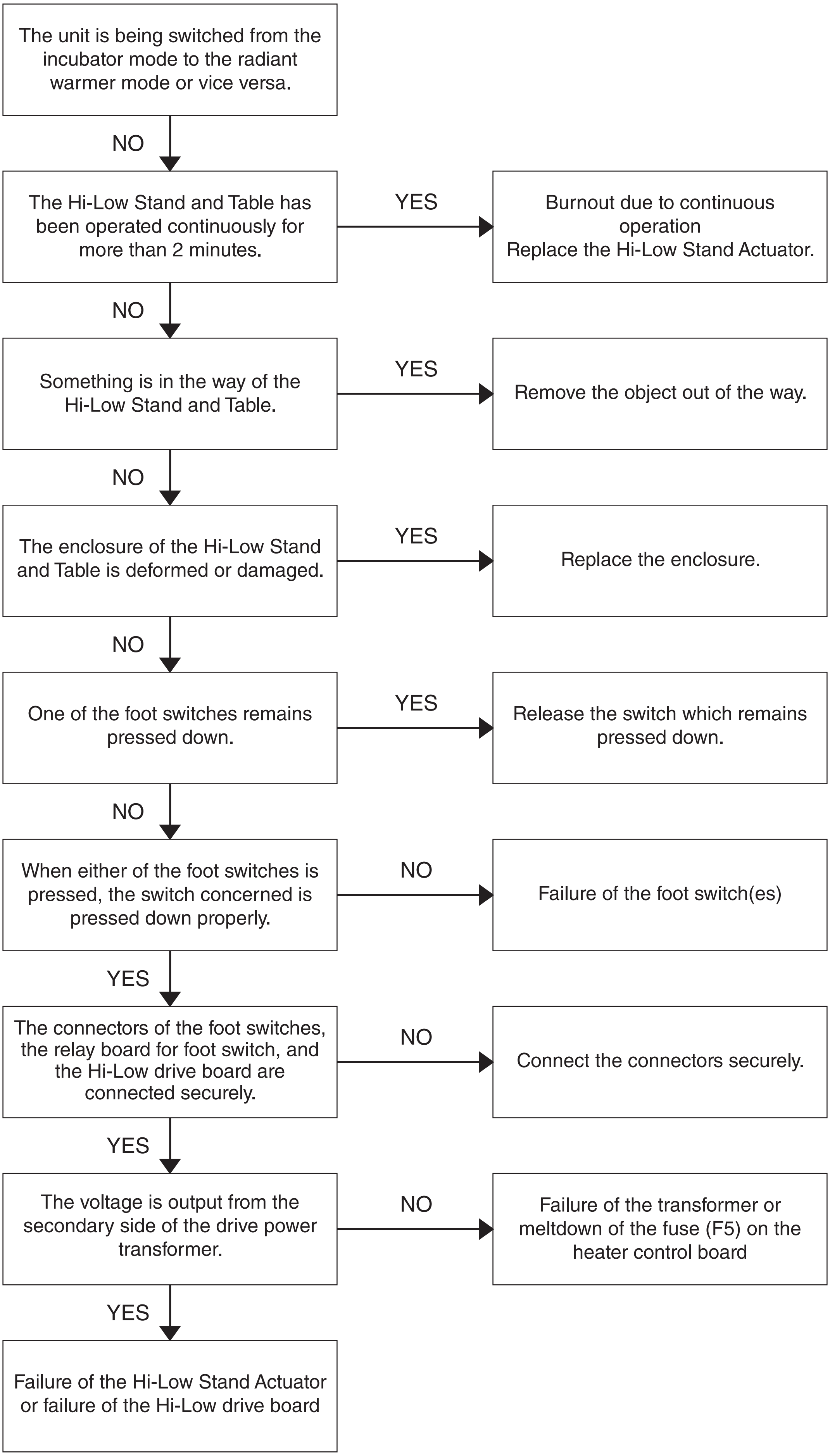
⑦ The weight screen cannot be displayed.


The weight screen display switch appears on the screen.
NO
The weight monitor function has not been set yet or is set incorrectly. Contact your local Atom representative.
YES
See (2) ③ "The display does not respond when the screen is touched."

⑧ The clock on the display does not operate properly.

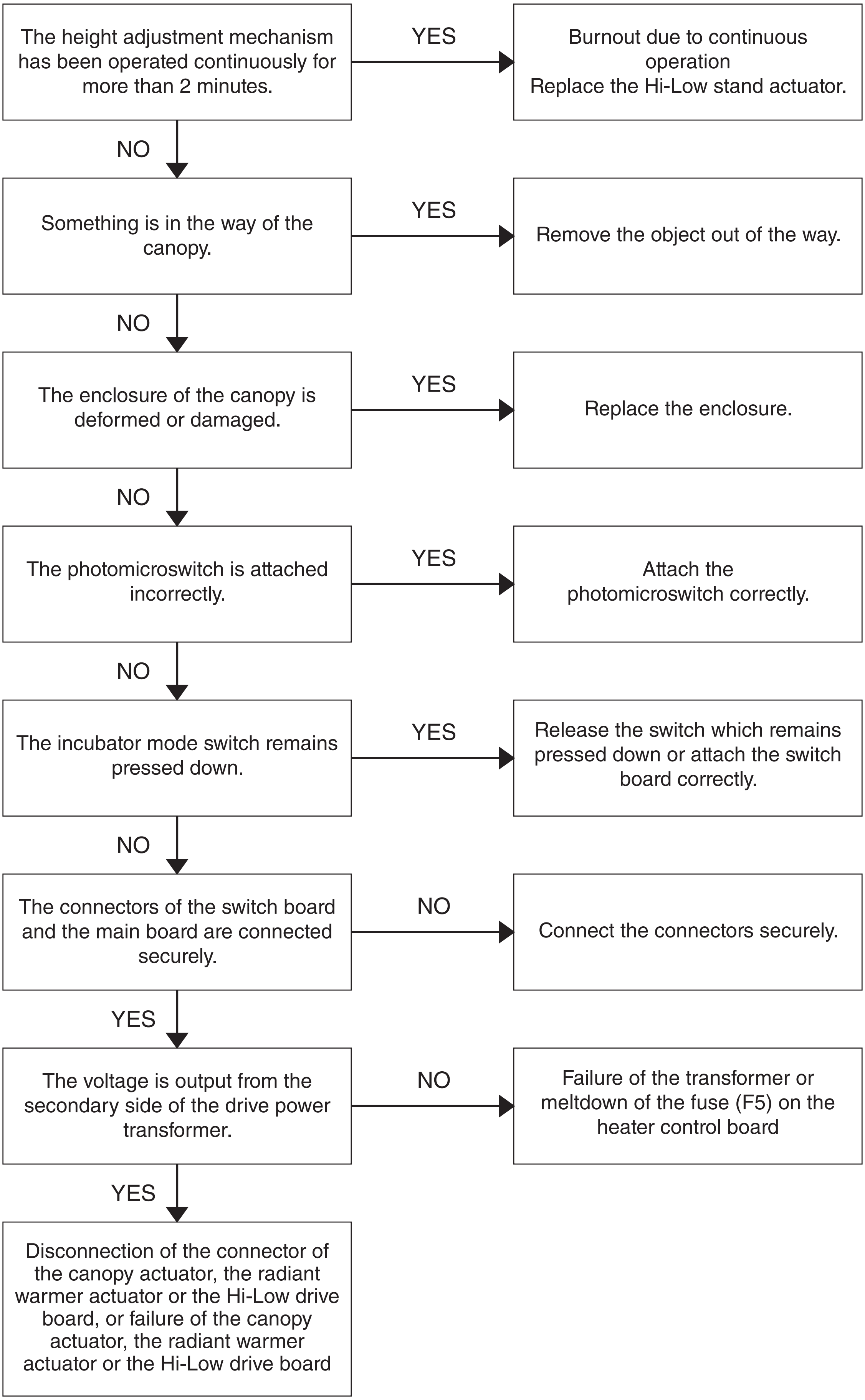

The unit has been used for more than four years or so.
YES
Replace the button cell battery on the LCD display board.
NO
The clock operates normally in normal use, but when the unit is operated after having been turned off for some time, the clock shows the wrong time.
YES
Replace the button cell battery on the LCD display board.
NO
Failure of the LCD display board

⑨ The Hi-Low Stand and Table is not adjustable vertically.


The unit is being switched from the incubator mode to the radiant warmer mode or vice versa.
NO
The Hi-Low Stand and Table has been operated continuously for more than 2 minutes.
YES
Burnout due to continuous operation
Replace the Hi-Low Stand Actuator.
NO
Something is in the way of the Hi-Low Stand and Table.
YES
Remove the object out of the way.
NO
The enclosure of the Hi-Low Stand and Table is deformed or damaged.
YES
Replace the enclosure.
NO
One of the foot switches remains pressed down.
YES
Release the switch which remains pressed down.
NO
When either of the foot switches is pressed, the switch concerned is pressed down properly.
NO
Failure of the foot switch(es)
YES
The connectors of the foot switches, the relay board for foot switch, and the Hi-Low drive board are connected securely.
NO
Connect the connectors securely.
YES
The voltage is output from the secondary side of the drive power transformer.
NO
Failure of the transformer or meltdown of the fuse (F5) on the heater control board
YES
Failure of the Hi-Low Stand Actuator or failure of the Hi-Low drive board

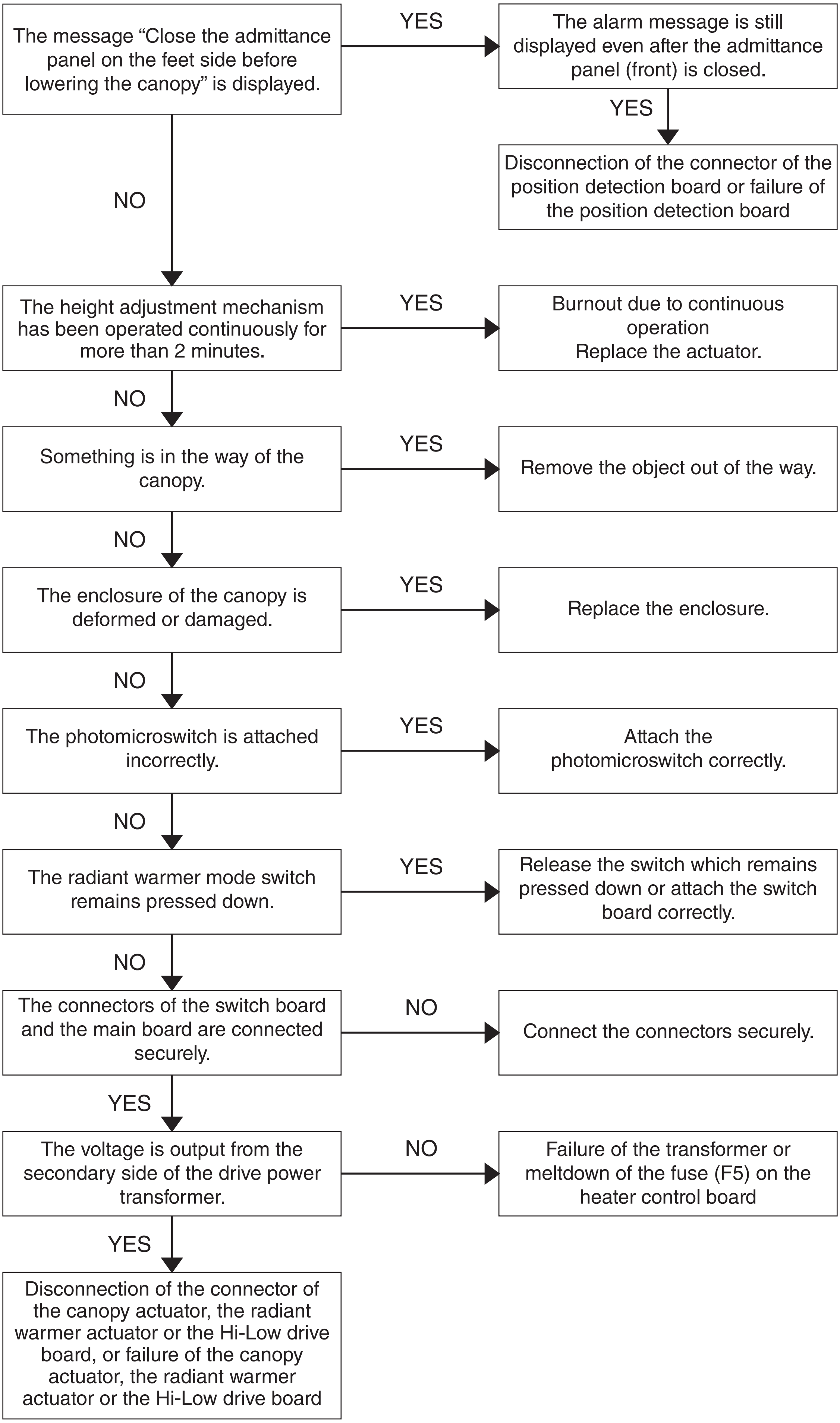
✻ The Hi-Low Stand and Table can be operated only when the power switch of the main body is turned ON.

⑩ The unit cannot be switched from the incubator mode to the radiant warmer mode.
(The canopy and the radiant warmer do not go up.)


The height adjustment mechanism has been operated continuously for more than 2 minutes.
YES
Burnout due to continuous operation
Replace the Hi-Low stand actuator.
NO
Something is in the way of the canopy.
YES
Remove the object out of the way.
NO
The enclosure of the canopy is deformed or damaged.
YES
Replace the enclosure.
NO
The photomicroswitch is attached incorrectly.
YES
Attach the photomicroswitch correctly.
NO
The incubator mode switch remains pressed down.
YES
Release the switch which remains pressed down or attach the switch board correctly.
NO
The connectors of the switch board and the main board are connected securely.
NO
Connect the connectors securely.
YES
The voltage is output from the secondary side of the drive power transformer.
NO
Failure of the transformer or meltdown of the fuse (F5) on the heater control board
YES
Disconnection of the connector of the canopy actuator, the radiant warmer actuator or the Hi-Low drive board, or failure of the canopy actuator, the radiant warmer actuator or the Hi-Low drive board

⑪ The unit cannot be switched from the radiant warmer mode to the incubator mode.

(The canopy and the radiant warmer do not go down.)


The message "Close the admittance panel on the feet side before lowering the canopy" is displayed.
YES
The alarm message is still displayed even after the admittance panel (front) is closed.
YES
Disconnection of the connector of the position detection board or failure of the position detection board
NO
The height adjustment mechanism has been operated continuously for more than 2 minutes.
YES
Burnout due to continuous operation
Replace the actuator.
NO
Something is in the way of the canopy.
YES
Remove the object out of the way.
NO
The enclosure of the canopy is deformed or damaged.
YES
Replace the enclosure.
NO
The photomicroswitch is attached incorrectly.
YES
Attach the photomicroswitch correctly.
NO
The radiant warmer mode switch remains pressed down.
YES
Release the switch which remains pressed down or attach the switch board correctly.
NO
The connectors of the switch board and the main board are connected securely.
NO
Connect the connectors securely.
YES
The voltage is output from the secondary side of the drive power transformer.
NO
Failure of the transformer or meltdown of the fuse (F5) on the heater control board
YES
Disconnection of the connector of the canopy actuator, the radiant warmer actuator or the Hi-Low drive board, or failure of the canopy actuator, the radiant warmer actuator or the Hi-Low drive board

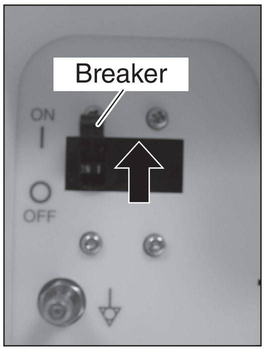
[6] Disassembly and Replacement Procedures

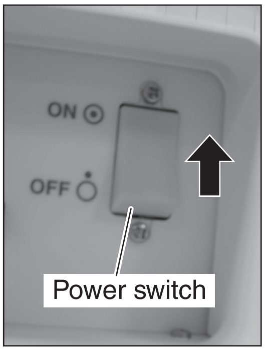
Before disassembling and replacing the components of the unit, be sure to turn the power off, remove the power cord from the AC inlet, and allow the incubator and the heaters to cool down sufficiently.
After completing the following procedures, perform the functional inspection according to “3-3. Inspection Checklist” provided in “[3] Maintenance Inspection.”

6-1. Stand

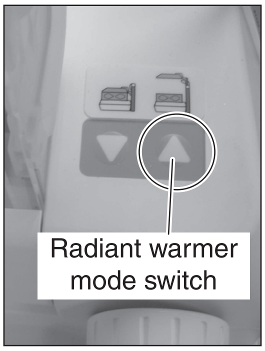
6-1-1. Removing the Main Body from the Stand

(1) Turn on the power of the main body.
Connect the power cord of the main body. After making sure that the breaker is ON, turn on the power switch of the main body.

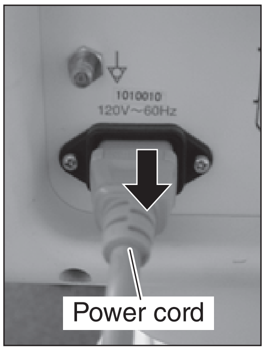


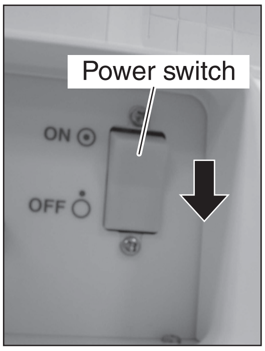


(2) Switch the unit to the radiant warmer mode.
Press the radiant warmer mode switch on the main body of the incubator.

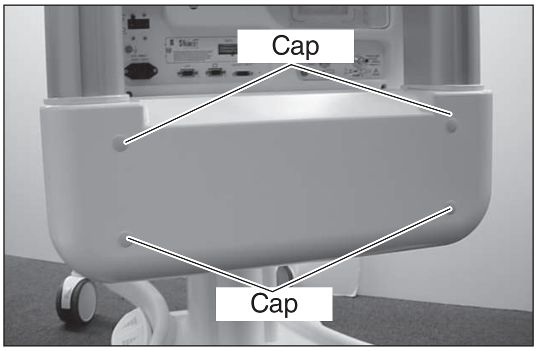


(3) Turn off the power of the main body.
Turn off the power switch of the main body and remove the power cord from the power cord inlet.

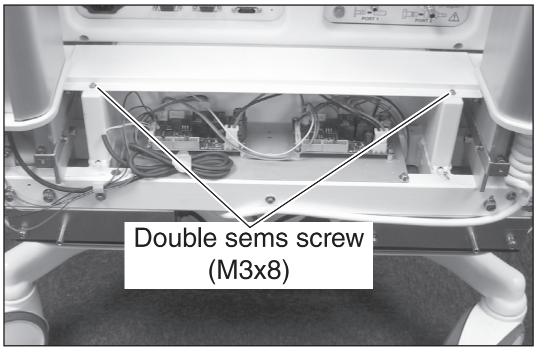




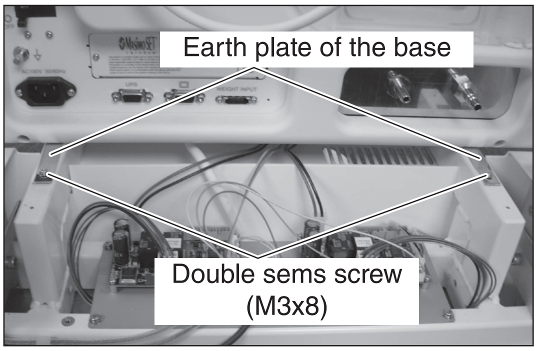
(4) Remove the F-rail pole under cover (rear).
Remove the four caps attached to the F-rail pole under cover (rear) and then remove the four double sems screws (M4 x 10) with a Phillips screwdriver.



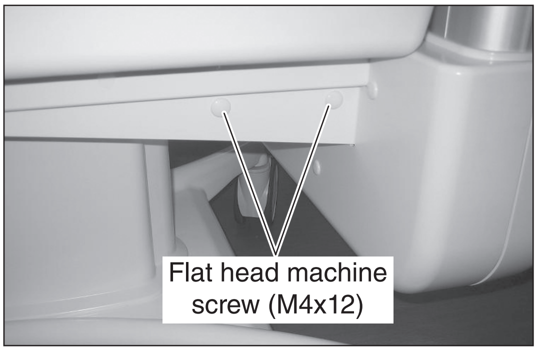
(5) Remove the dovetail rail cover.
Remove the two double sems screws (M3 x 8) with a Phillips screwdriver.

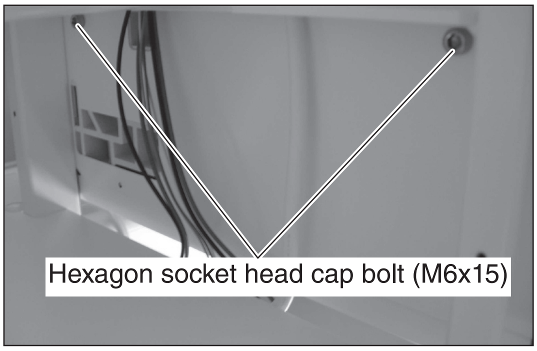

Double sems screw
(M3x8)

(6) Remove the two earth plates of the base.
Remove the two double sems screws (M3 x 8) with a Phillips screwdriver.


Earth plate of the base
Double sems screw
(M3x8)

(7) Remove the screws fixing the main body to the stand table.
Remove the four caps attached to the wiring protection plate. Remove the four flat head machine screws (M4 x 12) with a Phillips screwdriver and then remove the wiring protection plate. Use a hexagon wrench (distance between the opposite sides: 5mm) and remove the two hexagon socket head cap screws (M6 x 15).

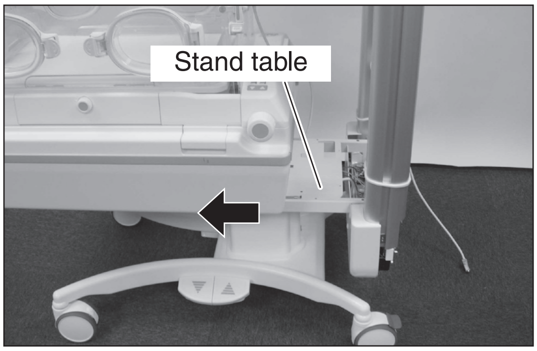

Flat head machine
screw (M4x12)


Hexagon socket head cap bolt (M6x15)

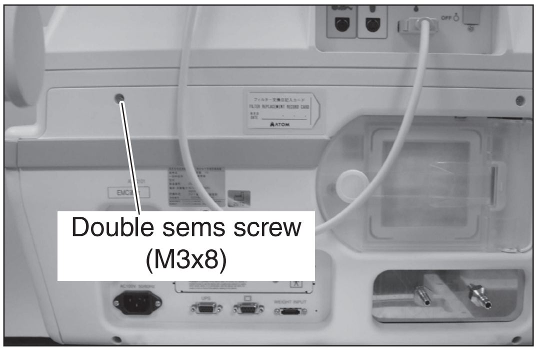
(8) Slide the main body.

Slide the main body on the surface of the stand table until it stops.

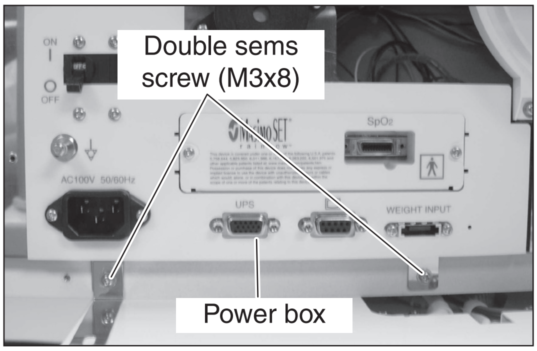
✻ For subsequent procedures after sliding the main body, fix the main body to the stand table with the two hexagon socket head cap screws (M6 x 15) in order to prevent it from falling off the stand table. Use the two holes in the main body from which you removed the two hexagon socket head cap screws in (7). (You will find two holes in the stand table after you slide the main body. Align the holes in the main body with them.)


Stand table

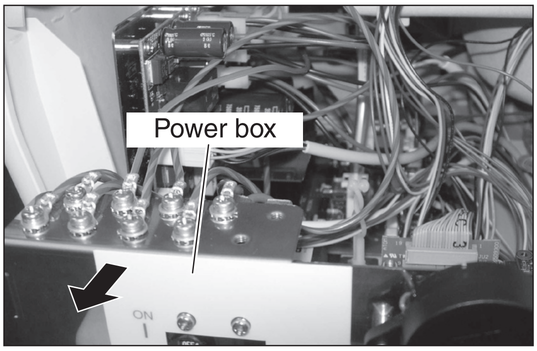
(9) Remove the rear panel of the main body.
Remove the four double sems screws (M3 x 8) with a Phillips screwdriver.


Double sems screw (M3x8)

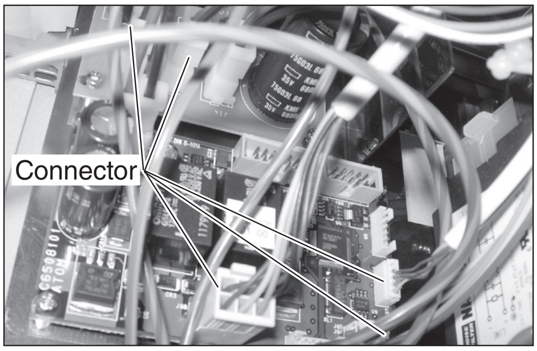
(10) Remove the screws fixing the power box.
Remove the two double sems screws (M3 x 8) with a Phillips screwdriver.


Double sems screw (M3x8)
Power box

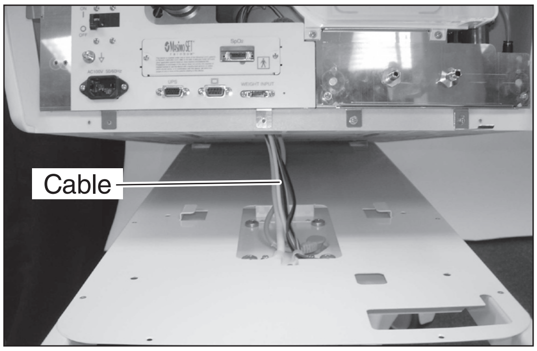
(11) Pull out the power box.



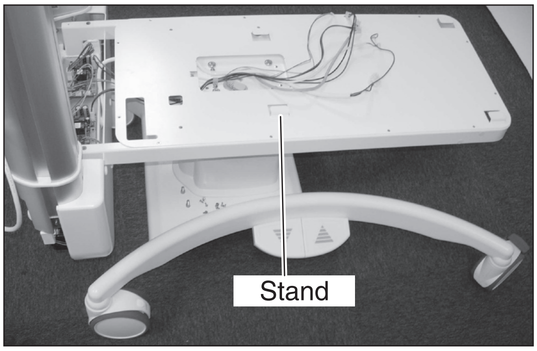
(12) Remove the wiring.
Remove the connectors JI2 and JI3 from the rectifier board, the connectors JQ4, JQ7 and JQ8 from the Hi-Low drive board and the connector JC3 from the heater control board. Remove the sems screw (M4x8) fixing the earthing terminal of the radiant warmer heater cable with a Phillips screwdriver.
For details, see "[8] Wiring Diagram."



(13) Tilt the main body and pull out the cables through the hole in the bottom of the main body.



(14) Lift up the main body and remove it from the stand.

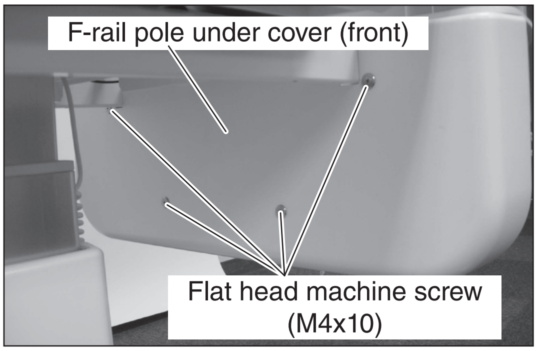


(15) Reassembly: Reassemble in the reverse order of disassembly.

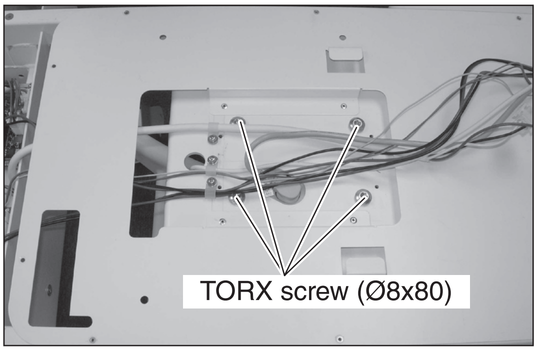
6-1-2. Replacing the Hi-Low Stand Actuator

(1) Remove the main body from the stand.
Follow (1) ~ (14) in "6-1-1. Removing the Main Body from the Stand."

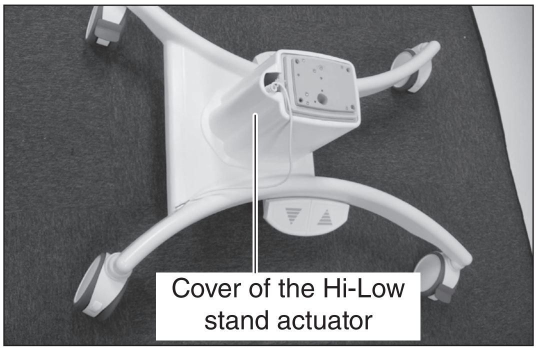
(2) Remove the F-rail pole under cover (front) from the stand table.
Remove the four flat head machine screws (M4 x 10) and then remove the F-rail pole under cover (front).


F-rail pole under cover (front)
Flat head machine screw (M4x10)

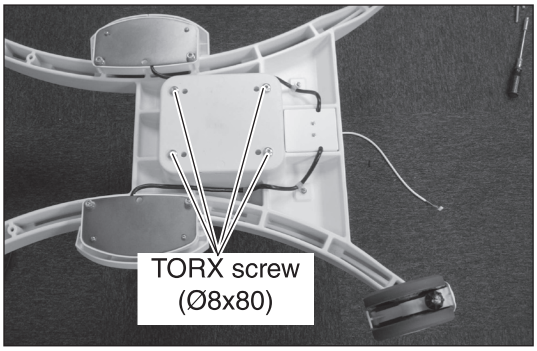
(3) Remove the stand table.
Remove the cable from the connector on the upper part of the Hi-Low stand actuator and then remove the cable clamp fixed with a screw. Remove the four TORX screws (Ø8 x 80) with a TORX driver.
For details, see "[8] Wiring Diagram."


TORX screw (Ø8x80)

(4) Remove the cover of the Hi-Low stand actuator.


Cover of the Hi-Low stand actuator

(5) Remove the Hi-Low stand actuator from the stand base.
Remove the four TORX screws (Ø8 x 80) with a TORX driver.

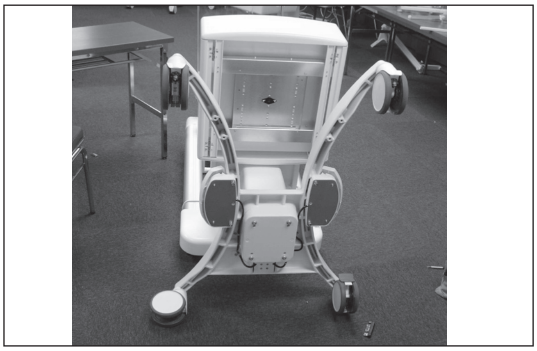

TORX screw
(Ø8x80)

(6) Reassembly: Reassemble in the reverse order of disassembly.

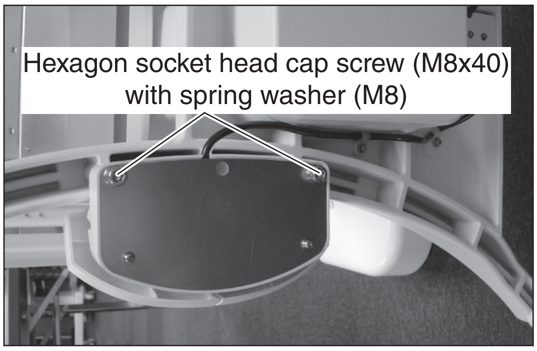
6-1-3. Replacing the Foot Switch

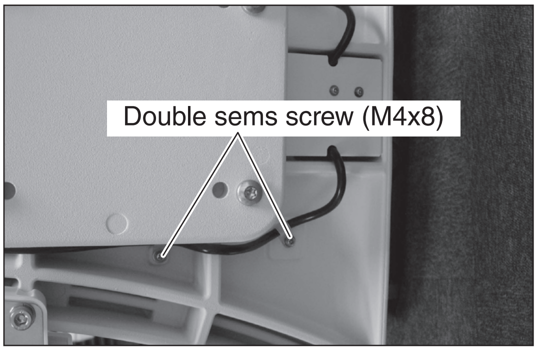
(1) Remove the main body from the stand.
See "6-1-1. Removing the Main Body from the Stand."

(2) Lay the stand with the dovetail rail side down.

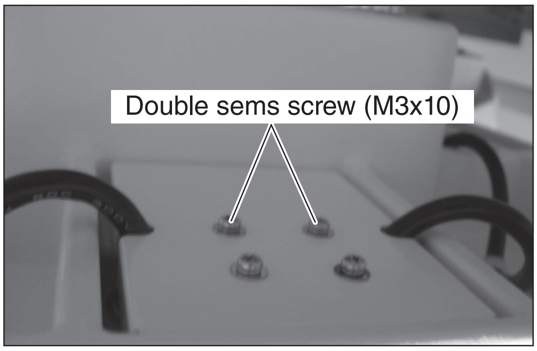


(3) Remove the foot switch from the stand base.
Use a hexagon wrench (distance between the opposite sides: 6mm) and remove the two hexagon socket head cap screws (M8 x 40) along with the spring washers (M8).
Remove the two double sems screws (M4 x 8) with a Phillips screwdriver.

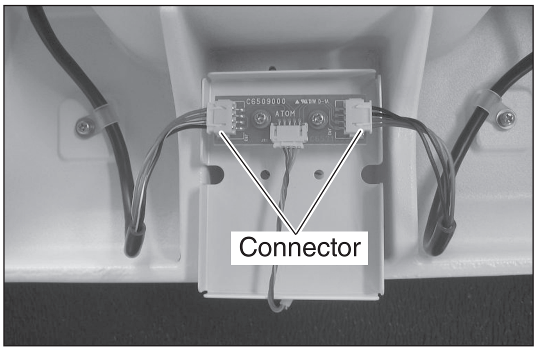

Hexagon socket head cap screw (M8x40)
with spring washer (M8)


Double sems screw (M4x8)

(4) Remove the cover of the relay board for foot switch.
Remove the two double sems screws (M3 x 10) with a Phillips screwdriver.



(5) Remove the connector of the foot switch you want to replace from the relay board for foot switch.
For details, see "[8] Wiring Diagram."

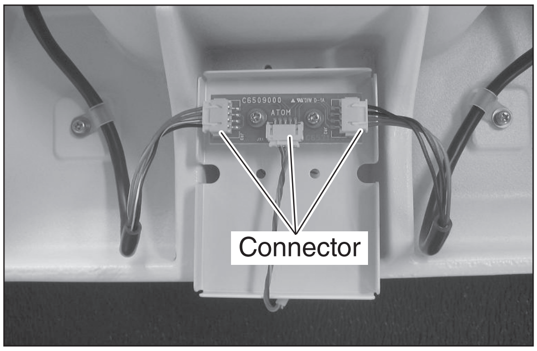


(6) Reassembly: Reassemble in the reverse order of disassembly.

6-1-4. Replacing the Relay Board for Foot Switch.

(1) Follow (1), (2) and (4) in "6-1-3. Replacing the Foot Switch."

(2) Remove the relay board for foot switch.
Remove the double sems screws (M3 x 8) with a Phillips screwdriver, and remove all of the connectors from the relay board for foot switch. For details, see "[8] Wiring Diagram."

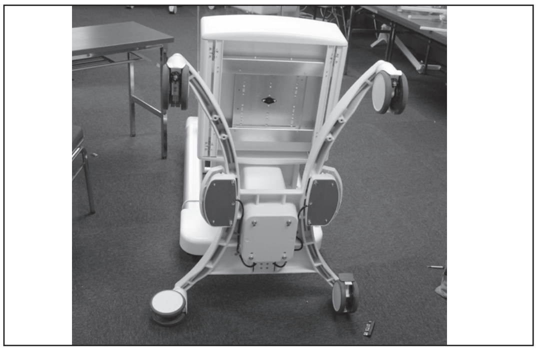


(3) Reassembly: Reassemble in the reverse order of disassembly.

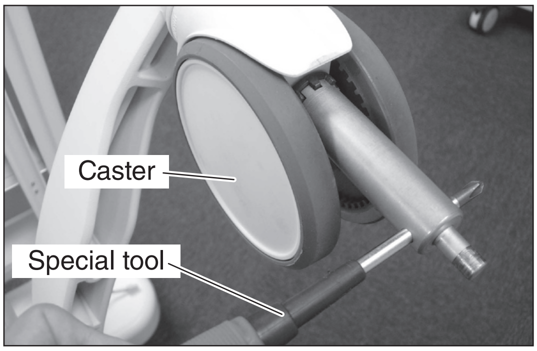
6-1-5. Replacing the Caster

(1) Remove the main body from the stand.
See "6-1-1. Removing the Main Body from the Stand."

(2) Lay the stand with the dovetail rail side down.



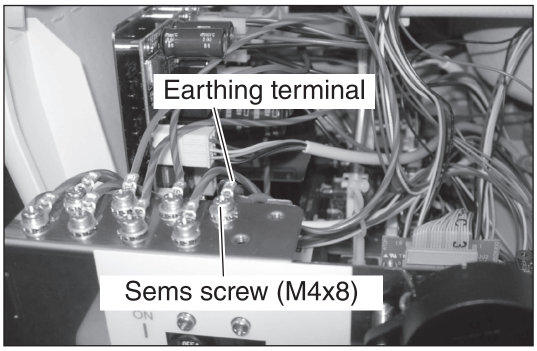
(3) Remove the caster with a special tool.



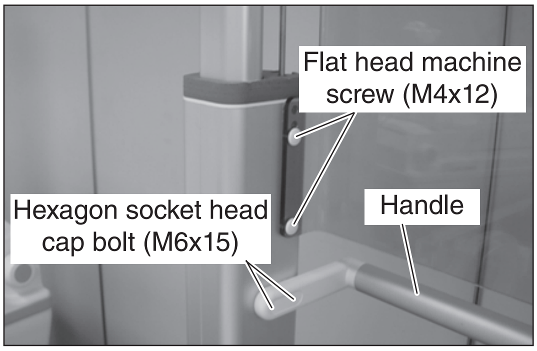
(4) Reassembly: Reassemble in the reverse order of disassembly.

6-1-6. Replacing the Radiant Warmer (with F-rail Pole, Height Adjustment Unit)

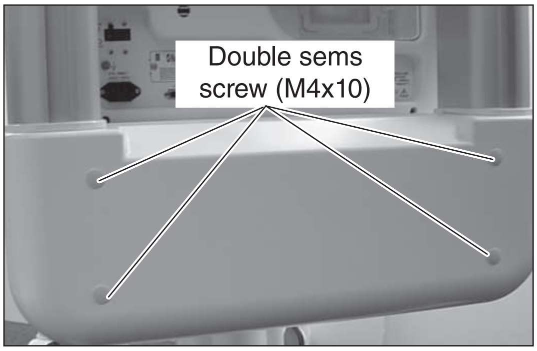
(1) Follow (1) ~ (11) in "6-1-1. Removing the Main Body from the Stand."
Remove the connector JC3 from the heater control board and remove the sems screw (M4 x 8) fixing the earthing terminal of the radiant warmer heater cable with a Phillips screwdriver. Then pull out the cable through the bottom of the main body.
For details, see "[8] Wiring Diagram."



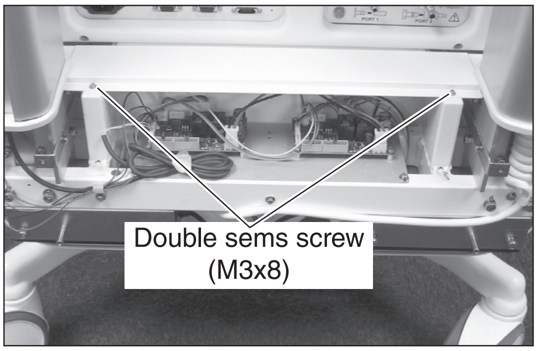
(2) Remove the handle and the radiant warmer guard.
Remove the two caps attached to the dovetail rail to which the radiant warmer is attached. Remove the two flat head machine screws (M4 x 12) with a Phillips screwdriver and then remove the radiant warmer guard from the dovetail rail.
Remove the protective stickers affixed to the handle on the dovetail rail to which the radiant warmer is attached. Remove the two hexagon socket head cap screws (M6 x 15) with a hexagon wrench (distance between the opposite sides: 5mm) and then remove the handle from the dovetail rail.


Flat head machine screw (M4x12)
Hexagon socket head cap bolt (M6x15)
Handle

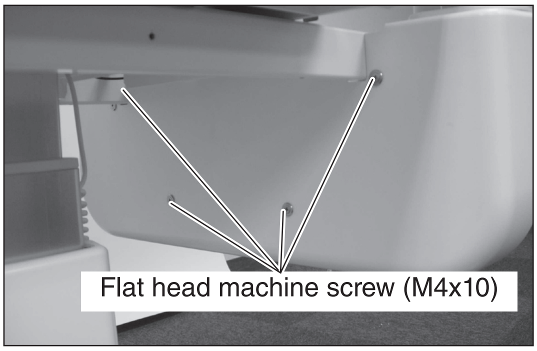
(3) Remove the F-rail pole under cover (rear).
Remove the four caps attached to the F-rail pole under cover (rear) and remove the four double sems screws (M4 x 10) with a Phillips screwdriver.


Double sems screw (M4x10)

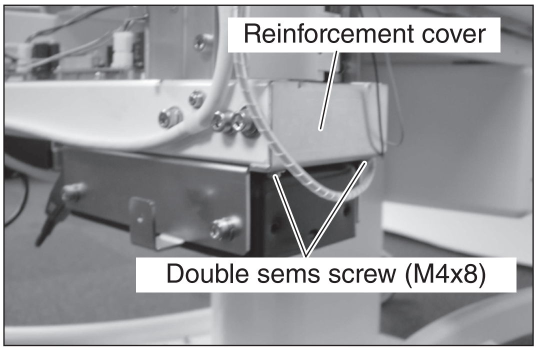
(4) Remove the dovetail rail cover.
Remove the two double sems screws (M3 x 8) with a Phillips screwdriver.

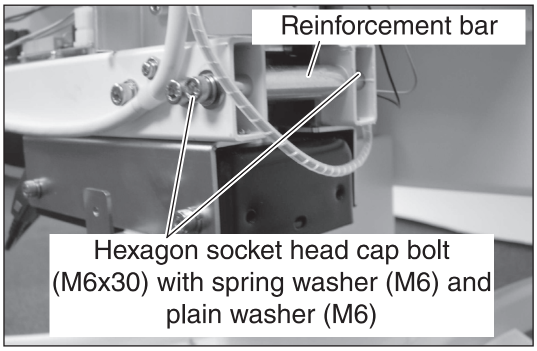

Double sems screw (M3x8)

(5) Remove the F-rail pole under cover (front) from the stand table.
Remove the four caps attached to the F-rail pole under cover (front). Remove the four flat head machine screws (M4 x 10) and then remove the F-rail pole under cover (front).

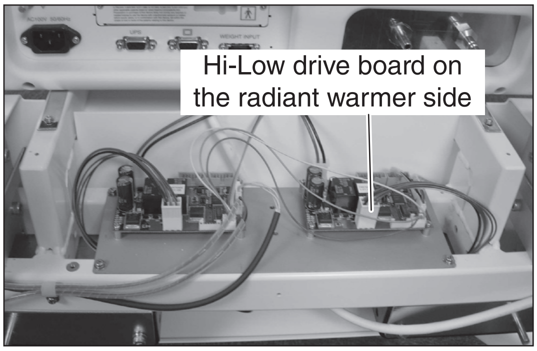

Flat head machine screw (M4x10)

(6) Remove the reinforcement cover and the reinforcement bar.
Remove the two double sems screws (M4 x 8) with a Phillips screwdriver and then remove the reinforcement cover.
Use a hexagon wrench (distance between the opposite sides: 5mm) and remove the two hexagon socket head cap screws (M6 x 30) along with the spring washers (M6) and the plain washers (M6). Then remove the reinforcement bar.


Reinforcement cover
Double sems screw (M4x8)

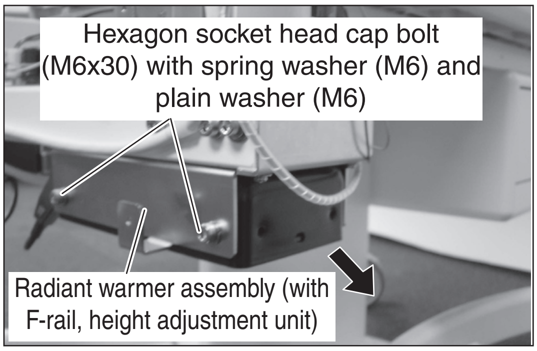

Reinforcement bar
Hexagon socket head cap bolt (M6x30) with spring washer (M6) and plain washer (M6)

(7) Remove the wiring connected to the radiant warmer (with F-rail pole, height adjustment unit).
Remove the connector JQ7 from the Hi-Low drive board on the radiant warmer side and the relay connector of the actuator on the radiant warmer side.
For details, see "[8] Wiring Diagram."


Hi-Low drive board on the radiant warmer side

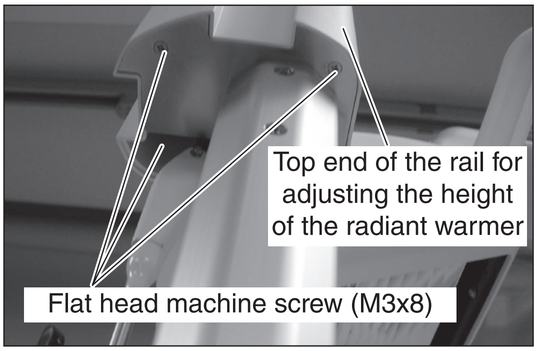
(8) Remove the radiant warmer (with F-rail pole, height adjustment unit).
Use a hexagon wrench (distance between the opposite sides: 5mm) and remove the four hexagon socket head cap screws (M6 x 30) along with the spring washers (M6) and the plain washers (M6).
Slide the radiant warmer (with F-rail pole, height adjustment unit) out of the frame and remove it.

(9) Reassembly: Reassemble in the reverse order of disassembly.


Hexagon socket head cap bolt (M6x30) with spring washer (M6) and plain washer (M6)
Radiant warmer assembly (with F-rail, height adjustment unit)

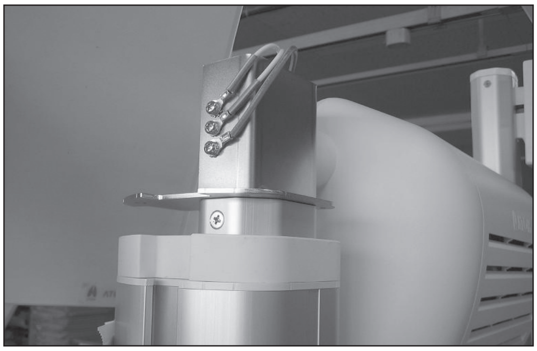
6-1-7. Replacing Heater for Radiant Warmer

(1) Remove the top end of the rail for adjusting the height of the radiant warmer.
Follow (1) ~ (3) in "6-1-1. Removing the Main Body from the Stand."
Remove the three flat head machine screws (M3 x 8) with a Phillips screwdriver and then remove the top end of the rail for adjusting the height of the radiant warmer.

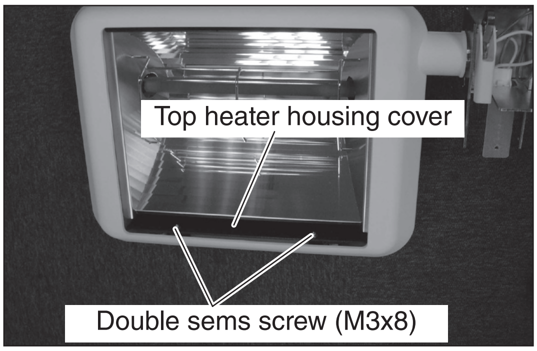

Top end of the rail for adjusting the height of the radiant warmer
Flat head machine screw (M3x8)

⚠CAUTION

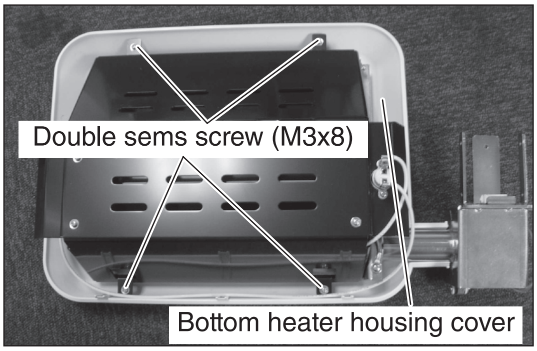
- ● The flat head machine screws are coated with a locking agent. If you cannot remove the screws, heat the heads of the screws with a dryer (with a 1000 watt dryer for about 6 minutes), then remove them.
- ● Be careful not to melt any plastic components when heating the screws.



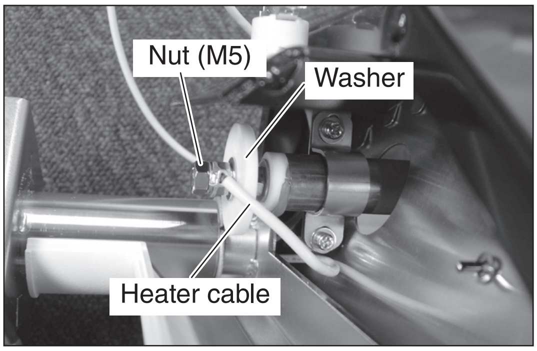
(2) Remove the top heater housing cover.
Remove the two double sems screws (M3 x 8) with a Phillips screwdriver and then remove the top heater housing cover.


Top heater housing cover
Double sems screw (M3x8)

(3) Remove the bottom heater housing cover.
Remove the four double sems screws (M3 x 8) with a Phillips screwdriver and then remove the bottom heater housing cover.

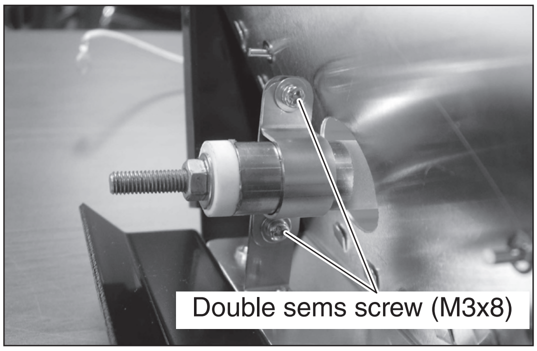

Double sems screw (M3x8)
Bottom heater housing cover

(4) Remove the heater cable and the washer.
Use a wrench (distance between the opposite sides: 8mm) and remove the nut (M5), the spring washer (M5), the heater cable, the nut (M5), the plain washer (M5), the washer and the plain washer (M5).


Nut (M5)
Washer
Heater cable

(5) Pull out the heater from the reflector.
Remove the four double sems screws (M3 x 8) attached to the heater clamp with a Phillips screwdriver and then pull out the heater from the reflector.

(6) Reassembly: Reassemble in the reverse order of disassembly.

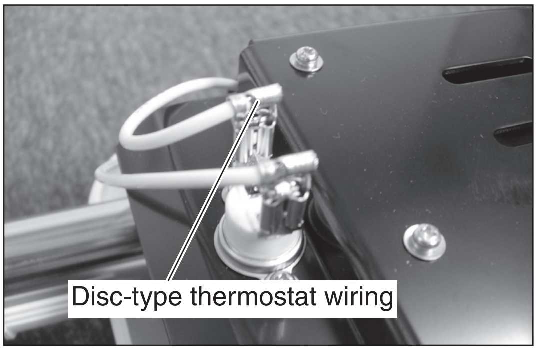

Double sems screw (M3x8)

⚠CAUTION

● Don’t touch the heater for the radiant warmer directly with your bare hand(s).

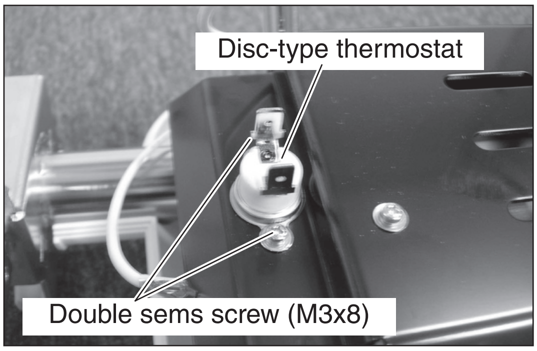
6-1-8. Replacing the Disc-type Thermostat for Radiant Warmer

(1) Remove the wiring of the disc-type thermostat.
Follow (1) ~ (2) in “6-1-7. Replacing the Heater for Radiant Warmer.”
Remove the wiring of the disc-type thermostat.


Disc-type thermostat wiring

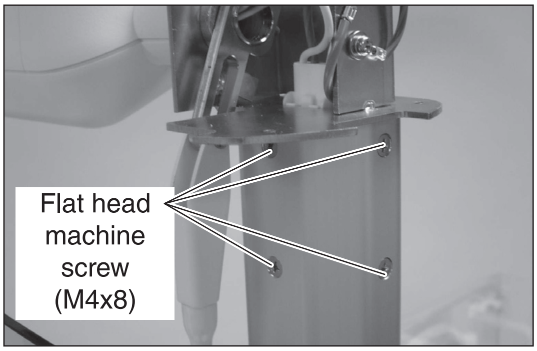
(2) Remove the disc-type thermostat.
Remove the two double sems screws (M3 x 8) with a Phillips screwdriver and then remove the disc-type thermostat from the frame of the radiant warmer.

(3) Reassembly: Reassemble in the reverse order of disassembly.


Disc-type thermostat
Double sems screw (M3x8)

6-1-9. Replacing the F-Rail Pole Spacer

(1) Remove the interlocking bar.
Follow (1) in "6-1-7. Replacing the Heater for Radiant Warmer." Remove the six flat head machine screws (M4 x 8) with a Phillips screwdriver. Turn over the white cover of the nut (M6) fixing the interlocking bar bracket and the interlocking bar. Loosen the nut with a wrench (distance between the opposite sides: 10mm) and remove the interlocking bar from the interlocking bar bracket.



⚠CAUTION

- The flat head machine screws are coated with a locking agent. If you cannot remove the screws, heat the heads of the screws with a dryer (with a 1000 watt dryer for about 6 minutes), then remove them.

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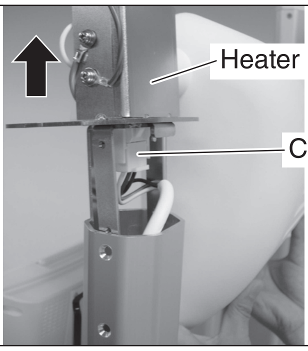
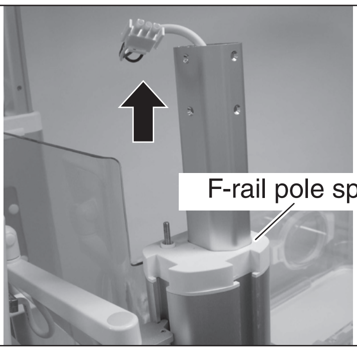
(2) Remove the heater housing.
Pull out the heater housing from the F-rail pole for radiant warmer and then remove the relay connecter of the radiant warmer heater cable.



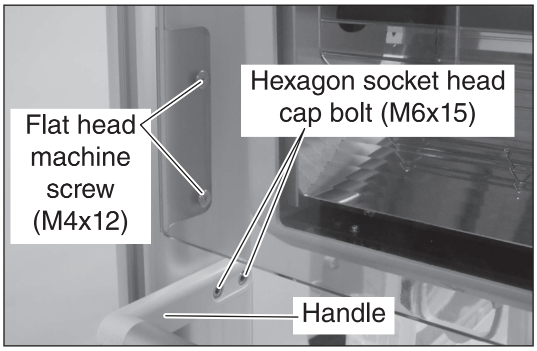
(3) Remove the F-rail pole spacer.
The F-rail pole spacer is affixed to the top board of the dovetail rail with a special double-faced adhesive tape. Be sure to clean and degrease the affixing surface before affixing the F-rail pole spacer.

(4) Reassembly: Reassemble in the reverse order of disassembly.

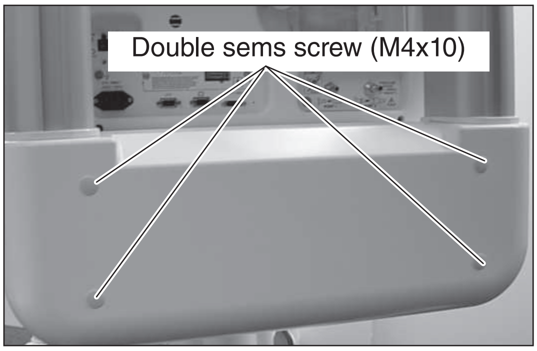


6-1-10. Replacing the Canopy (with Hi-Low Unit)

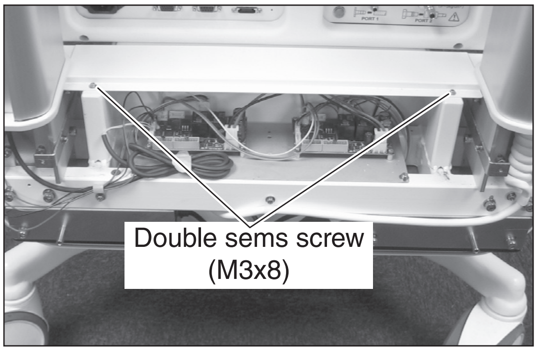
(1) Remove the handle and the radiant warmer guard.
Follow (1) ~ (3) in "6-1-1. Removing the Main Body from the Stand."
Remove the caps attached to the radiant warmer guard on the dovetail rail to which the canopy is attached. Remove the two flat head machine screws (M4 x 12) with a Phillips screwdriver and then remove the radiant warmer guard from the dovetail rail.
Remove the protective stickers affixed to the handle on the dovetail rail to which the canopy is attached. Remove the two hexagon socket head cap screws (M6 x 15) with a hexagon wrench (distance between the opposite sides: 5mm) and then remove the handle from the dovetail rail.


Flat head machine screw (M4x12)
Hexagon socket head cap bolt (M6x15)
Handle

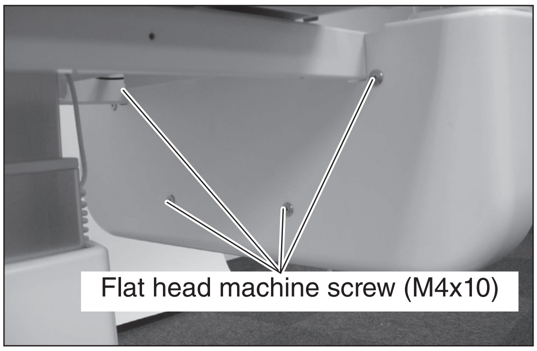
(2) Remove the F-rail pole under cover (rear).
Remove the four caps attached to the F-rail pole under cover (rear) and then remove the four double sems screws (M4 x 10) with a Phillips screwdriver.


Double sems screw (M4x10)

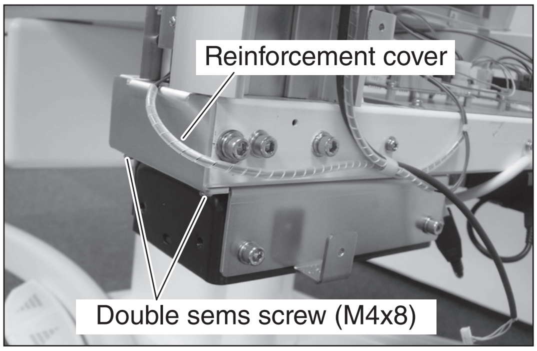
(3) Remove the dovetail rail cover.
Remove the two double sems screws (M3 x 8) with a Phillips screwdriver.

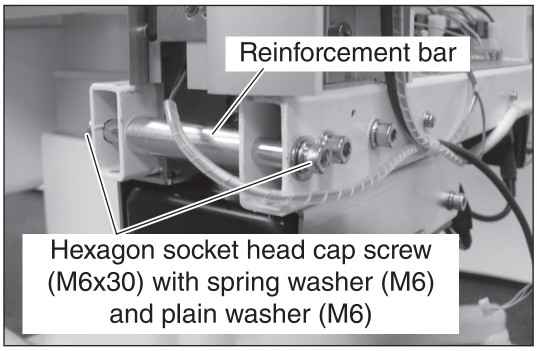

Double sems screw (M3x8)

(4) Remove the F-rail pole under cover (front) from the stand table.
Remove the four caps attached to the F-rail pole under cover (front). Remove the four flat head machine screws (M4 x 10) with a Phillips screwdriver and then remove the F-rail pole under cover (front).

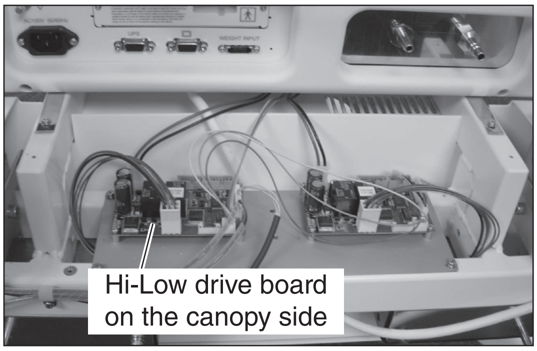

Flat head machine screw (M4x10)

(5) Remove the reinforcement cover and the reinforcement bar.
Remove the two double sems screws (M4 x 8) with a Phillips screwdriver and then remove the reinforcement cover.
Use a hexagon wrench (distance between the opposite sides: 5mm) and remove the two hexagon socket head cap screws (M6 x 30) along with the spring washers (M6) and the plain washers (M6). Then remove the reinforcement bar.


Reinforcement cover
Double sems screw (M4x8)

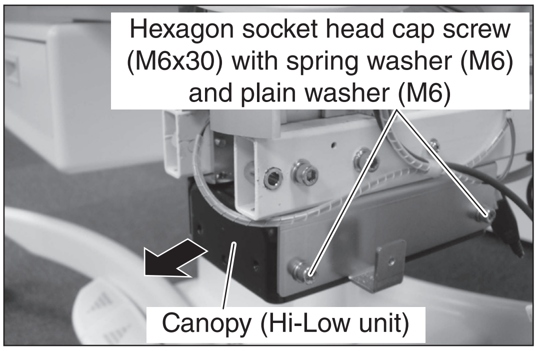

Reinforcement bar
Hexagon socket head cap screw (M6x30) with spring washer (M6) and plain washer (M6)

(6) Remove the wiring connected to the canopy (with Hi-Low unit).
Remove the connectors JQ7 and JQ9 from the Hi-Low drive board on the canopy side and the relay connector of the actuator on the canopy side.
For details, see "[8] Wiring Diagram."


Hi-Low drive board on the canopy side

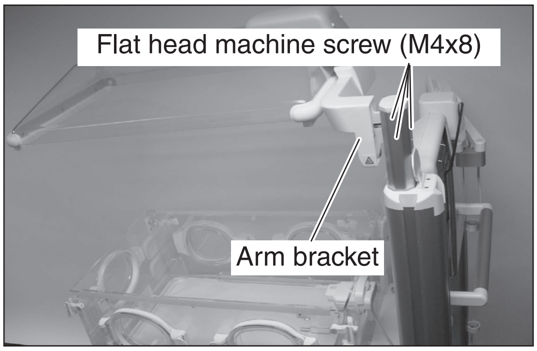
(7) Remove the canopy (with Hi-Low unit).
Use a hexagon wrench (distance between the opposite sides: 5mm) and remove the four hexagon socket head cap screws (M6 x 30) along with the spring washers (M6) and the plain washers (M6).
Slide the canopy (with Hi-Low unit) out of the frame and remove it.

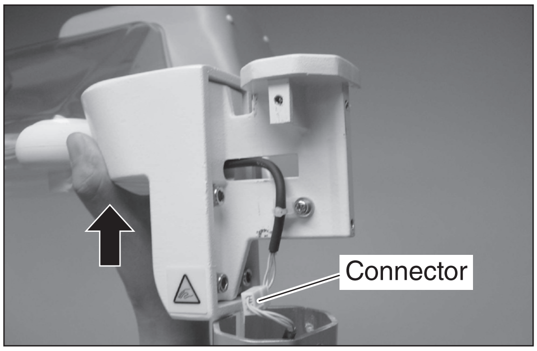
(8) Reassembly: Reassemble in the reverse order of disassembly.


Hexagon socket head cap screw (M6x30) with spring washer (M6) and plain washer (M6)
Canopy (Hi-Low unit)

6-1-11. Replacing the Canopy

(1) Remove the canopy.
Follow (1) ~ (3) in "6-1-1. Removing the Main Body from the Stand." Remove the four flat head machine screws (M4 x 8) with a Phillips screwdriver and then pull up and remove the arm bracket. Remove the relay connector of the photomicroswitch.


Flat head machine screw (M4x8)
Arm bracket



⚠CAUTION

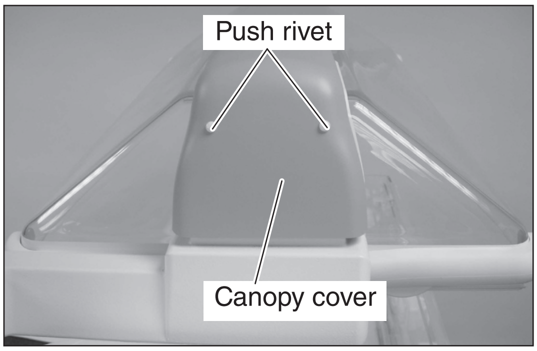
- ● The flat head machine screws are coated with a locking agent. If you cannot remove the screws, heat the heads of the screws with a dryer (with a 1000 watt dryer for about 6 minutes), then remove them.

---

(2) Reassembly: Reassemble in the reverse order of disassembly.

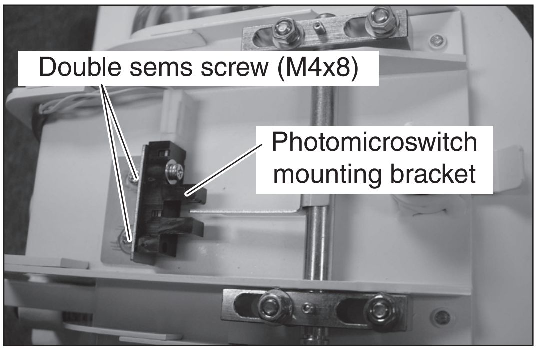
6-1-12. Replacing the Photomicroswitch

(1) Remove the canopy cover.
Remove the two push rivets on the back of the canopy cover and remove the canopy cover.

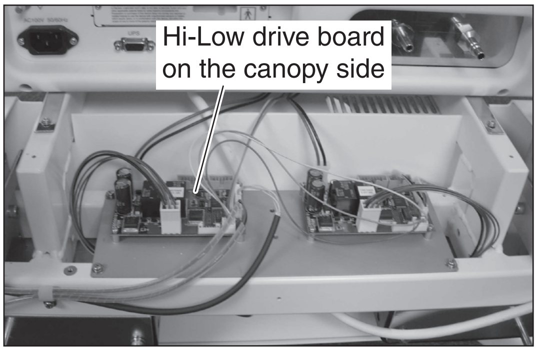

Push rivet
Canopy cover

(2) Remove the photomicroswitch.
Remove the two double sems screws (M4 x 8) with a Phillips screwdriver and then remove the photomicroswitch on the canopy arm bracket together with its mounting bracket.
Remove the cable from the photomicrocswitch.

(3) Reassembly: Reassemble in the reverse order of disassembly.


Double sems screw (M4x8)
Photomicroswitch mounting bracket

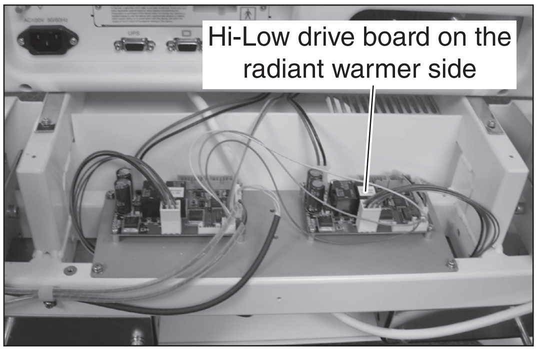
6-1-13. Replacing the Hi-Low Drive Board



(1) Replace the Hi-Low drive board on the canopy side.
Follow (4) ~ (5) in "6-1-1. Removing the Main Body from the Stand."
Remove all the connectors from the Hi-Low drive board on the canopy side. Remove the four sems screws (M3 x 8) with a Phillips screwdriver and then remove the Hi-Low drive board on the canopy side.
For details, see "[8] Wiring Diagram."

(2) Connect the jumper pin to the "C" of the connector JQ10 on a new Hi-Low drive board on the canopy side to use.

(3) Reassembly: Reassemble in the reverse order of disassembly.



(4) Replace the Hi-Low drive board on the radiant warmer side.
Follow (4) ~ (5) in "6-1-1. Removing the Main Body from the Stand."
Remove all the connectors from the Hi-Low drive board on the radiant warmer side. Remove the four sems screws (M3 x 8) with a Phillips screwdriver and then remove the Hi-Low drive board on the radiant warmer side.
For details, see "[8] Wiring Diagram."

(5) Connect the jumper pin to the "W" of the connector JQ10 on a new Hi-Low drive board on the radiant warmer side to use.

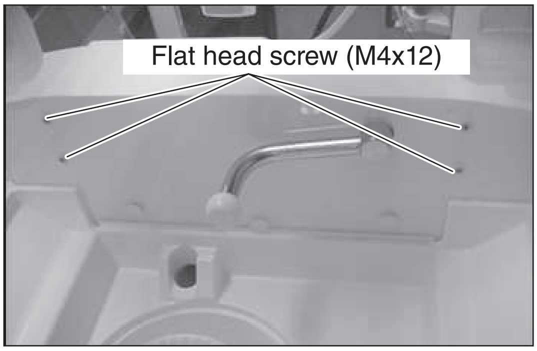
(6) Reassembly: Reassemble in the reverse order of disassembly.

6-2. Hood

6-2-1. Replacing the Admittance Panel (Rear)

(1) Remove the rear panel of the main body.
Follow (1) ~ (9) in "6-1-1. Removing the Main Body from the Stand."

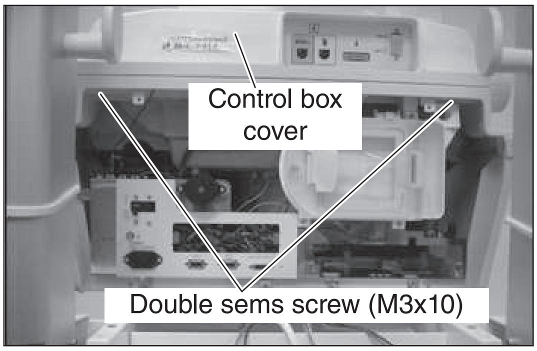
(2) Remove the control box cover.
Remove the four protective stickers and then remove the four flat head screws (M4 x 12) with a Phillips screwdriver.



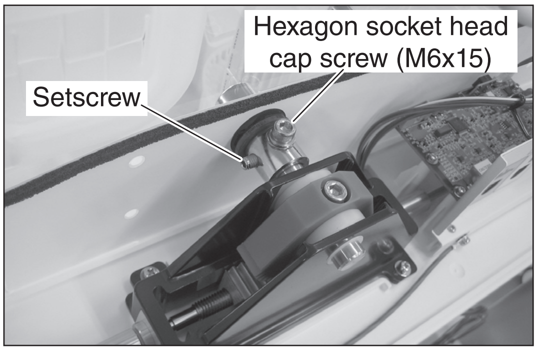
⚠CAUTION

- The flat head machine screws are coated with a locking agent. If you cannot remove the screws, heat the heads of the screws with a dryer (with a 1000 watt dryer for about 6 minutes), then remove them.
- Be careful not to melt any plastic components when heating the screws.

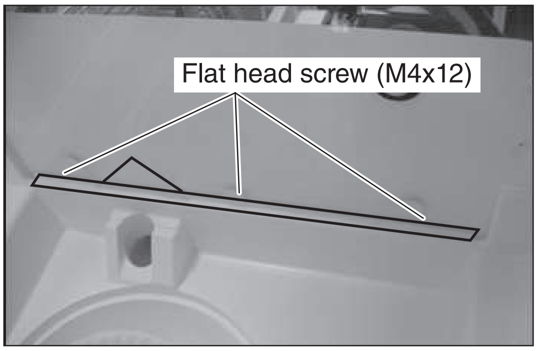
Remove the two double sems screws (M3 x 10) fixing the control box cover from inside the upper section of the main body with a Phillips screwdriver. Pull up the control box cover and remove it.



(3) Remove the tilting arm.
Loosen the hexagon socket head cap screw (M6x15) with a hexagon wrench (distance between the opposite sides: 5mm), and then loosen the setscrew with a hexagon wrench (distance between the opposite sides: 3mm). Move the tilting arm fixing ring toward the tilting unit of the mattress platform. Then remove the tilting arm from the tilting unit of the mattress platform.



(4) Remove the admittance panel (rear).
Remove the four protective stickers and the sheet. Remove the three flat head screws (M4 x 12) with a Phillips screwdriver and then pull up and remove the admittance panel (rear) from the main body.



⚠CAUTION

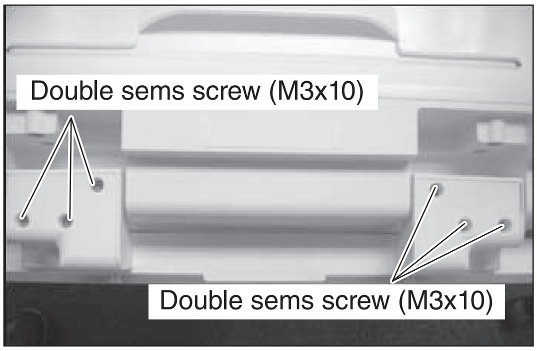
- The flat head machine screws are coated with a locking agent. If you cannot remove the screws, heat the heads of the screws with a dryer (with a 1000 watt dryer for about 6 minutes), then remove them.
- Be careful not to melt any plastic components when heating the screws.

---

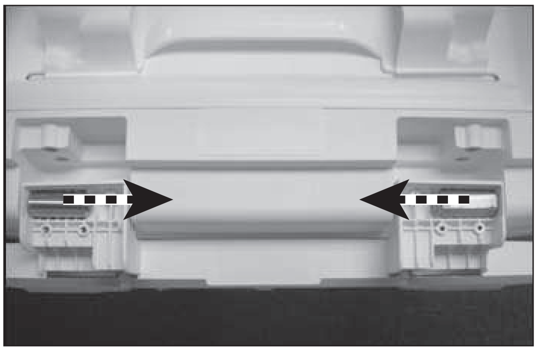
(5) Reassembly: Reassemble in the reverse order of disassembly.

6-2-2. Replacing the Admittance Panel (Front)

(1) Remove the admittance panel hinge cover.
Remove the protective stickers affixed to both sides of the foot-side hood hinge cover and then remove the six double sems screws (M3 x 10) with a Phillips screwdriver. Slide the hinge cover upward and remove it.



(2) Remove the rotary damper (right) and the admittance panel rotary shaft.
Slide the rotary damper and the rotary shaft horizontally and remove them from their bearings. Then remove the admittance panel (front).

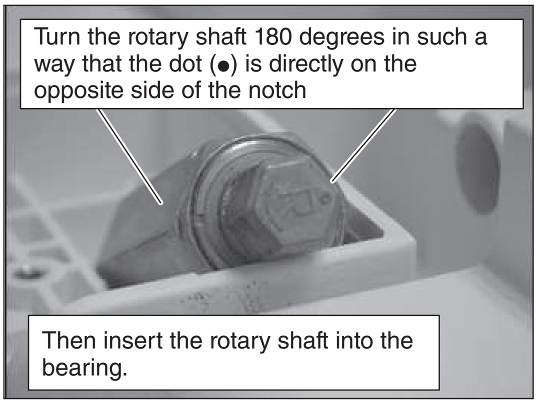


(3) Reassembly: Reassemble in reverse order of disassembly.

⚠CAUTION

<Bear in mind the following point when attaching the rotary damper (right) >

- Before attaching a new rotary damper, be sure to turn the rotary shaft 180 degrees.

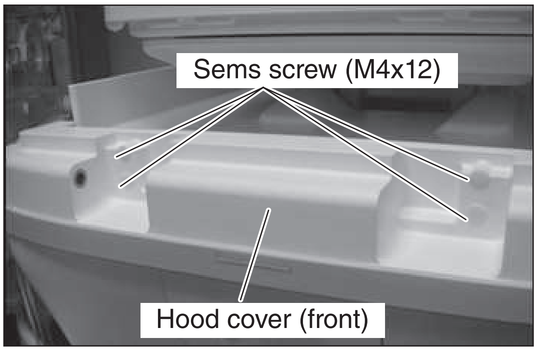

Turn the rotary shaft 180 degrees in such a way that the dot (●) is directly on the opposite side of the notch

Then insert the rotary shaft into the bearing.

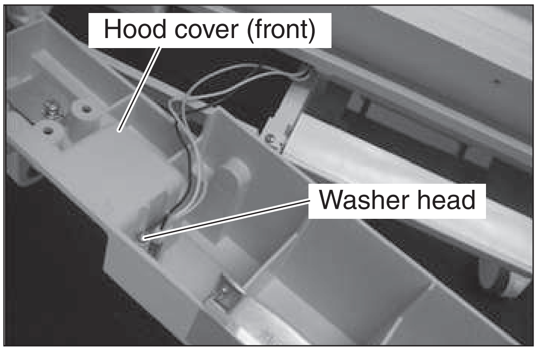
6-2-3. Replacing the Hood Cover (Front)

(1) Remove the admittance panel hinge.
Follow (1) and (2) in “6-2-2. Replacing the Admittance Panel (Front).”

(2) Remove the hood cover (front).
Remove the protective sticker and the four hole plugs. Remove the four sems screws (M4 x 12) with a Phillips screwdriver and then slide the hood cover (front) upward.



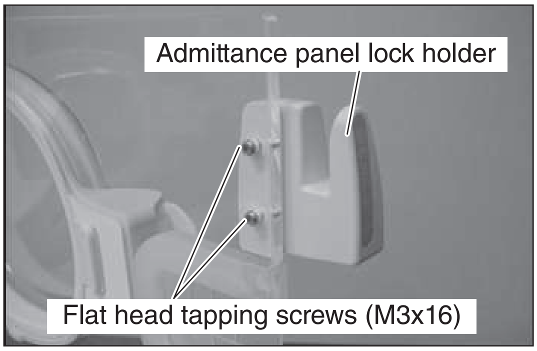
Remove the position detection board inside the hood cover (front). Remove the washer head with a Phillips screwdriver.


Hood cover (front)
Washer head

(3) Reassembly: Reassemble in the reverse order of disassembly.

6-2-4. Replacing the Admittance Panel Lock Holder

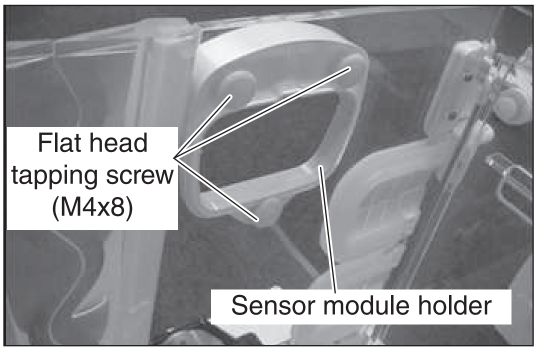
(1) Remove the admittance panel lock holder.
Remove the two connector caps and then remove the two flat head tapping screws (M3x16) with a Phillips screwdriver.


Admittance panel lock holder
Flat head tapping screws (M3x16)

(2) Reassembly: Reassemble in the reverse order of disassembly.

6-2-5. Replacing the Sensor Module Holder

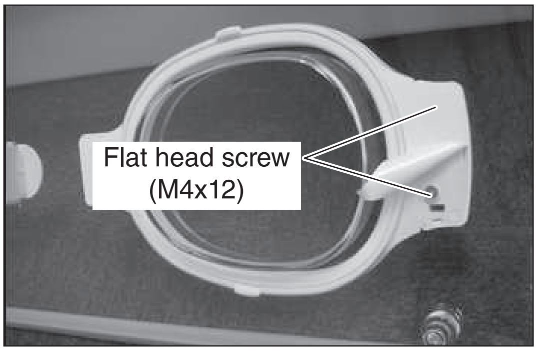
(1) Remove the three connector caps and then remove the three flat head tapping screws (M4 x 8) with a Phillips screwdriver. Remove the sensor module holder.


Flat head tapping screw (M4x8)
Sensor module holder

(2) Reassembly: Reassemble in the reverse order of disassembly.

6-2-6. Replacing the Snap-open Access Port

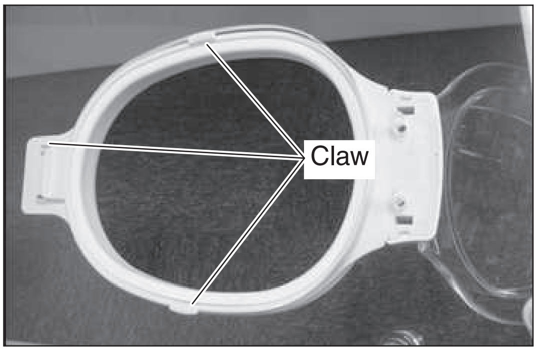
(1) Remove the snap-open access port. Remove the protective sticker and then remove the two flat head screws (M4 x 12) with a Phillips screwdriver.



⚠CAUTION

- ● The flat head machine screws are coated with a locking agent. If you cannot remove the screws, heat the heads of the screws with a dryer (with a 1000 watt dryer for about 6 minutes), then remove them.
- ● Be careful not to melt any plastic components when heating the screws.

With the snap-open access port open, detach it from the three claws on its base and then remove the snap-open access port.

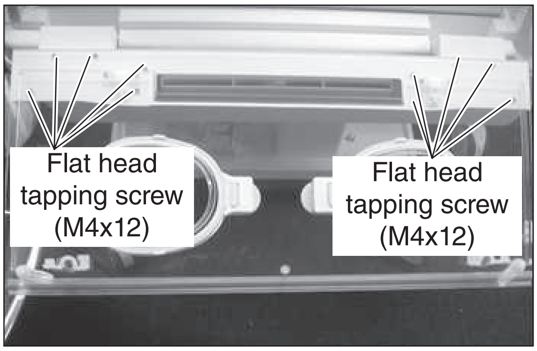


(2) Follow the same procedure mentioned above to remove the other snap-open access port.

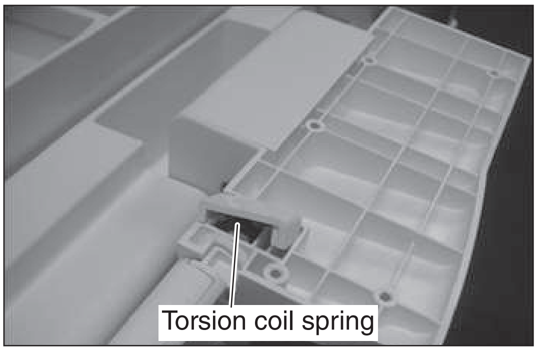
(3) Reassembly: Reassemble in the reverse order of disassembly.

6-2-7. Replacing the Admittance Panel

(1) Remove the admittance panel.
Remove the ten protective stickers affixed to the admittance panel. With the X-ray cassette tray door open, remove the ten flat head tapping screws (M4 x 12) with a Phillips screwdriver.


Flat head tapping screw (M4x12)
Flat head tapping screw (M4x12)

Torsion coil springs are housed inside the spring covers of the admittance panel hinges on both sides. Be careful not to let the torsion coil springs come off when assembling the admittance panel.



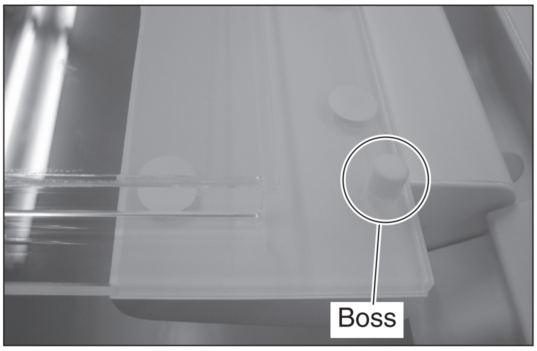
(2) Follow the same procedure mentioned above to remove the admittance panel on the opposite side.

(3) Reassembly: Reassemble in the reverse order of disassembly.

⚠CAUTION

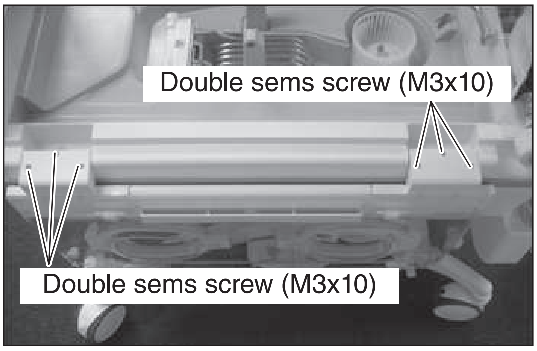
<Bear in mind the following point when attaching the admittance panels (right/left)>

- ● Only the admittance panel for the right side of the incubator has a boss on its lower internal surface. Be sure to attach it to the right side of the incubator.

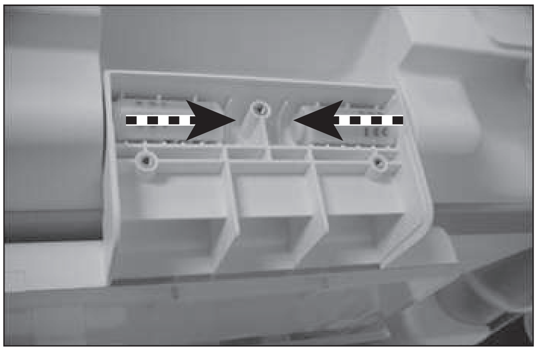


6-2-8. Replacing the Admittance Panel Hinge

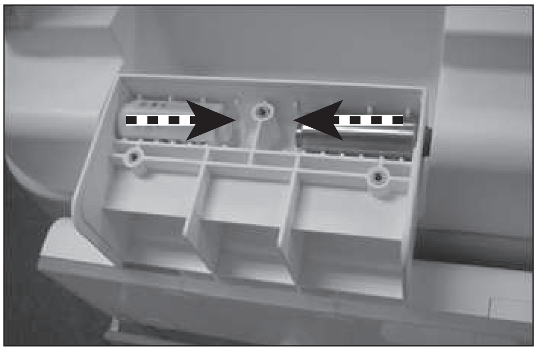
(1) Remove the admittance panel hinge cover.
Remove the protective stickers affixed to the admittance panel hinge cover and then remove the six double sems screws (M3 x 10) with a Phillips screwdriver.



(2) Remove the rotary dampers (right & left) and the admittance panel rotary shaft.
Slide horizontally the rotary dampers (right & left) inside the admittance panel hinge (side) on your right and remove them from their bearings.



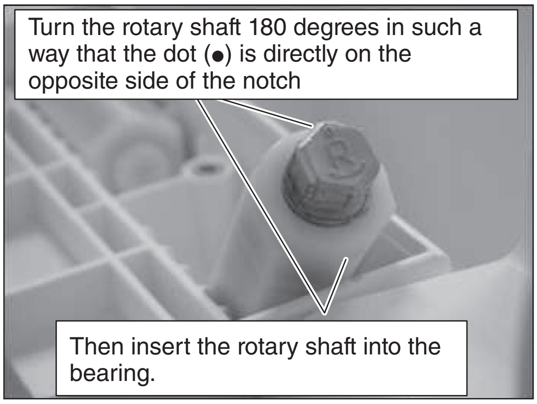
Slide horizontally the rotary damper (left) and the admittance panel rotary shaft inside the admittance panel hinge (left) on your left and remove them from their bearing.



(3) Remove the admittance panel hinge (side) (with X-ray cassette tray door).
Follow (1) in “6-2-7. Replacing the Admittance Panel.”

(4) Follow the same procedure mentioned above to remove the admittance panel hinges on the admittance panel on the opposite side.

(5) Reassembly: Reassemble in the reverse order of disassembly.



Turn the rotary shaft 180 degrees in such a way that the dot (●) is directly on the opposite side of the notch

Then insert the rotary shaft into the bearing.

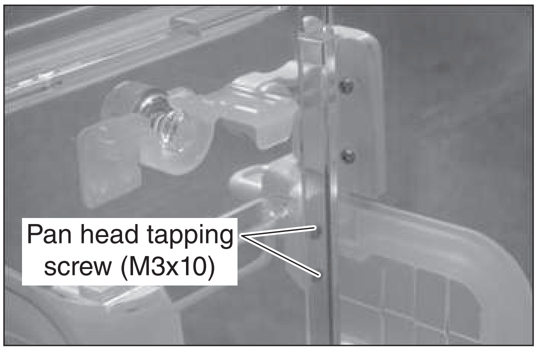
⚠CAUTION

<Bear in mind the following point when attaching the rotary dampers (right & left) >

● Before attaching a new rotary damper, be sure to turn the rotary shaft 180 degrees.

6-2-9. Replacing the Admittance Panel Operating Lever Right/Left

(1) Remove the admittance panel operating lever. Remove the protective stickers affixed to the admittance panel. Remove the two pan head tapping screws (M3 x 10) with a Phillips screwdriver and then remove the admittance panel operating lever.

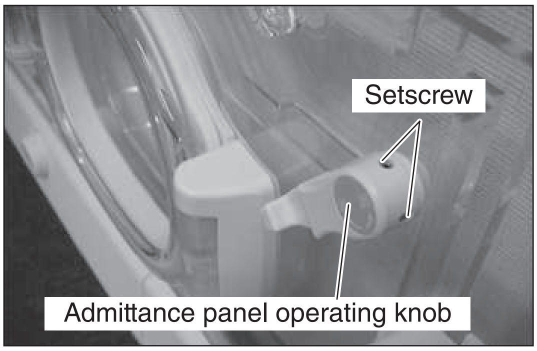


(2) Follow the same procedure mentioned above to remove the other admittance panel operating lever.

(3) Reassembly: Reassemble in the reverse order of disassembly.

6-2-10. Replacing the Admittance Panel Operating Knob

(1) Remove the admittance panel operating knob. Loosen the two setscrews with a hexagon wrench (distance between the opposite sides: 2mm). Slide the admittance panel operating shaft and remove the admittance panel operating knob.
(A spacer is placed between the admittance panel operating knob and the admittance panel. Be careful not to let the spacer come off when attaching the admittance panel operating knob.)

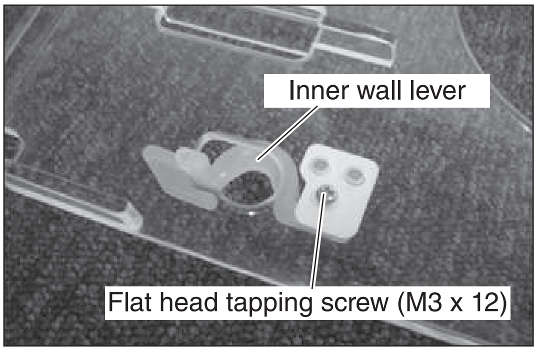


(2) Follow the same procedure mentioned above to remove the other admittance panel operating knobs.

(3) Reassembly: Reassemble in the reverse order of disassembly.

6-2-11. Replacing the Inner Wall Lever Right/Left

(1) Remove the inner wall lever.
Remove the connector cap and then remove the flat head tapping screw (M3 x 12) with a Phillips screwdriver.
Slide the inner wall lever from the admittance panel and remove it.

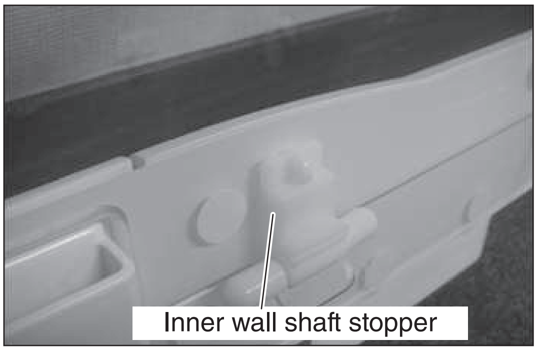


(2) Follow the same procedure mentioned above to remove the other inner wall levers.

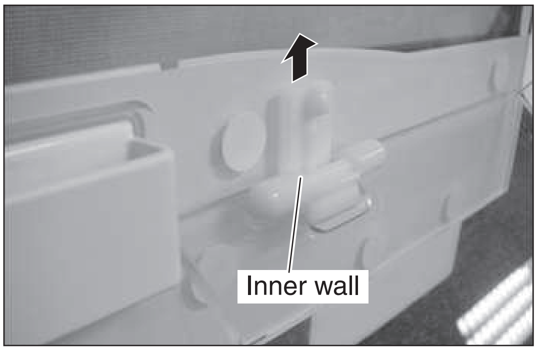
(3) Reassembly: Reassemble in the reverse order of disassembly.

6-2-12. Replacing the Inner Panel Right/Left

(1) Remove the inner wall shaft bearing.
Push down the snap fit tab with a flat head screwdriver or some other appropriate instrument and remove the inner wall shaft bearings (on both sides of the inner panel).

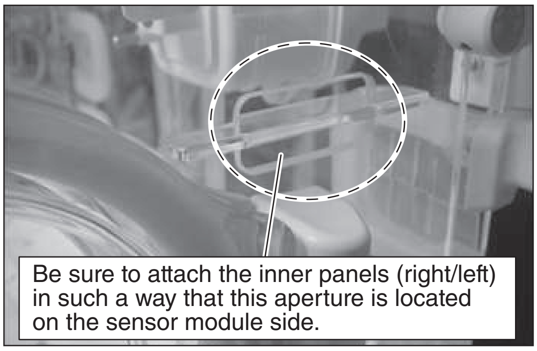


(2) Remove the inner panel.
Remove the inner wall levers on both sides of the inner panel. Slide the inner panel and remove it.



(3) Follow the same procedure mentioned above to remove the other inner panel.

(4) Reassembly: Reassemble in the reverse order of disassembly.



Be sure to attach the inner panels (right/left) in such a way that this aperture is located on the sensor module side.

⚠CAUTION

<Bear in mind the following point when attaching the inner panels (right/ left)>

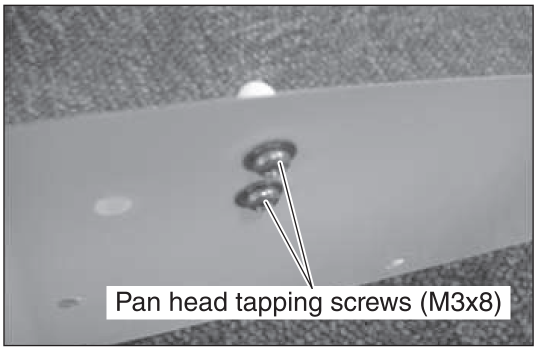
- Be sure to attach the inner panels (right/left) in such a way that the baffle attached to the aperture of the inner panel is located on the sensor module side.

6-2-13. Replacing the Inner Wall Bearing

(1) Remove the inner panel.
Follow (1) and (2) in "6-2-12. Replacing the Inner Panel Right/Left."

(2) Remove the admittance panel rotary shaft.
Follow (1) ~ (3) in "6-2-8. Replacing the Admittance Panel Hinge."

(3) Remove the inner wall bearing.
Remove the two pan head tapping screws (M3 x 8) with a Phillips screwdriver. Slide the inner wall bearing and remove it from the admittance panel.
(Larger plain washers (M3) are attached to the pan head tapping screws. Be careful not to let the washers come off when assembling the inner wall bearing.)



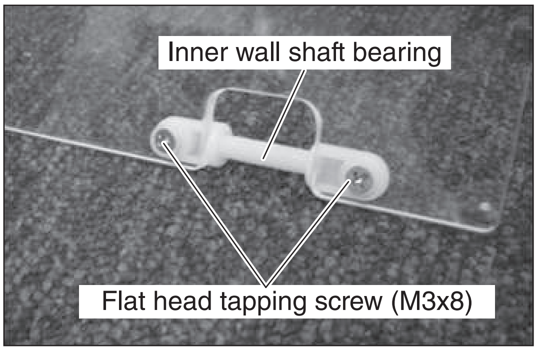
(4) Follow the same procedure mentioned above to remove the other inner wall bearings.

(5) Reassembly: Reassemble in the reverse order of disassembly.

6-2-14. Replacing the Inner Wall Shaft Bearing

(1) Remove the inner panel.
Follow (1) and (2) in "6-2-12. Replacing the Inner Panel Right/Left."

(2) Remove the inner wall shaft bearing.
Remove the two flat head tapping screws (M3 x 8) with a Phillips screwdriver.



(3) Follow the same procedure mentioned above to remove the other inner wall shaft bearing.

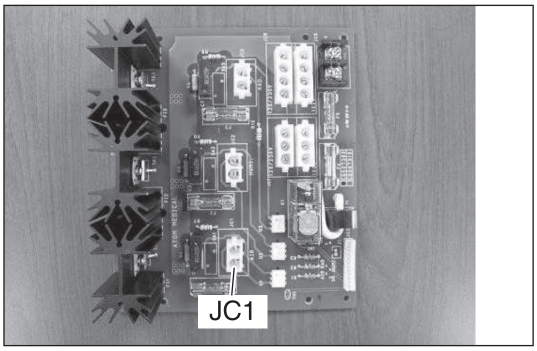
(4) Reassembly: Reassemble in the reverse order of disassembly.

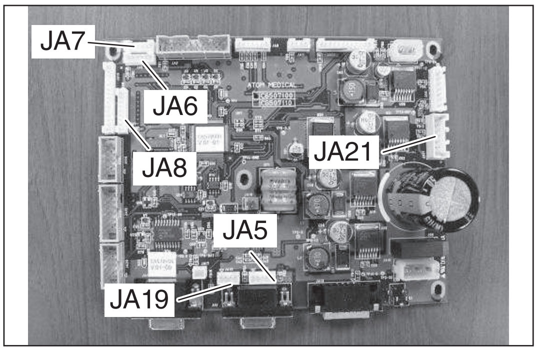
6-3. Main Body

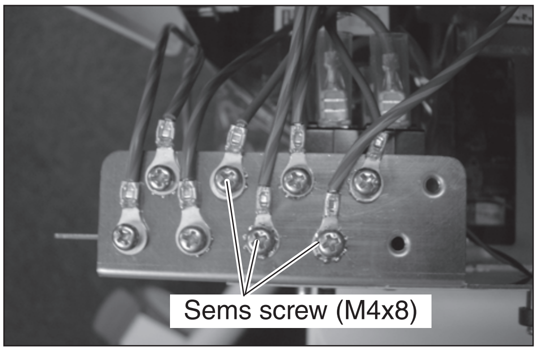
6-3-1. Removing the Upper Section of the Main Body from the Main Body

(1) Remove the rear panel of the main body and pull out the power box.
Follow (1) ~ (11) in "6-1-1. Removing the Main Body from the Stand."

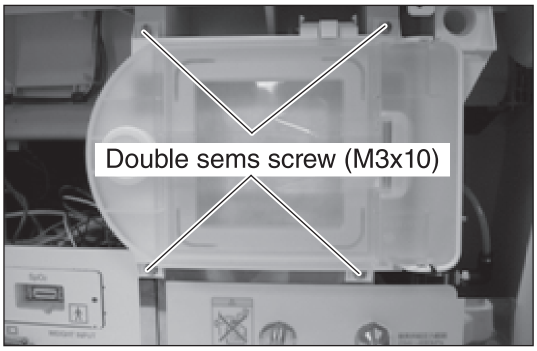
(2) Remove the wiring.
If the unit contains the SpO2 module, follow (2) and (3) in "6-4-1. Replacing the Main Board".
Remove the connector JC1 from the heater control board and the connectors JA5, JA6, JA7, JA8, JA19 and JA21 from the control board.
Remove the sems screws (M4x8) fixing the earthing terminals of the upper section of the main body, the heater and the high temperature sensor with a Phillips screwdriver.
For details, see "[8] Wiring Diagram."



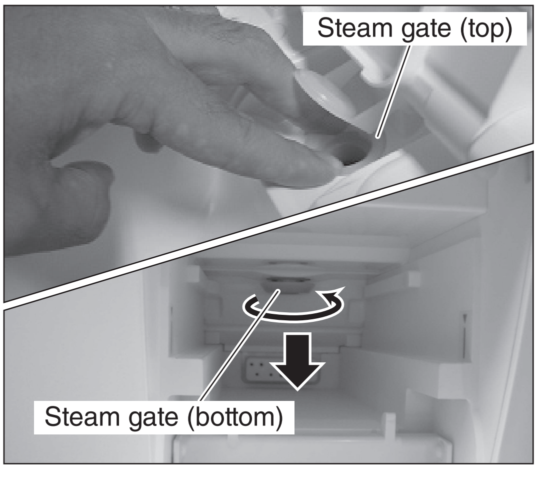

JA7
JA6
JA21
JA8
JA5
JA19


Sems screw (M4x8)

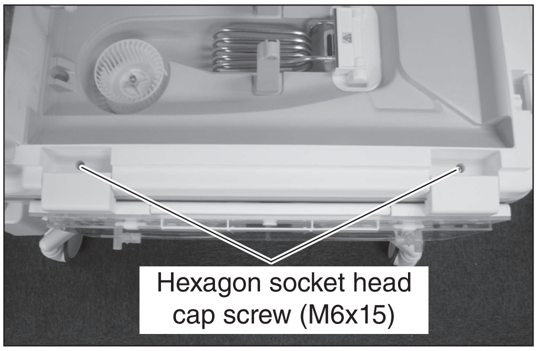
(3) Remove the filter assembly.
Remove the four double sems screws (M3 x 10) with a Phillips screwdriver. Remove the pipe of the oxygen supply valve and the connector of the position detection board of the filter assembly.


Double sems screw (M3x10)

(4) Remove the steam gate.
While holding the top of the steam gate under the heater unit, open the humidity chamber door, and twist and pull the bottom of the steam gate to remove it.


Steam gate (top)
Steam gate (bottom)

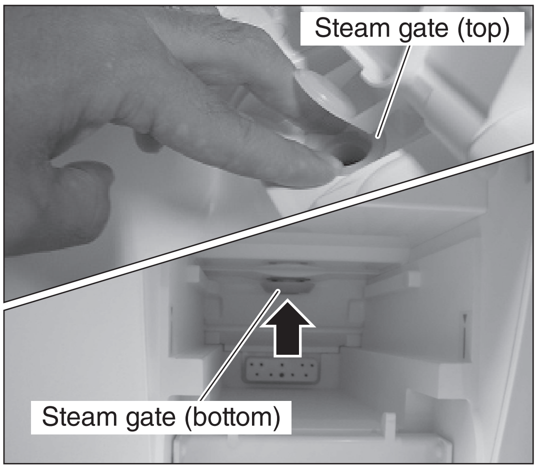
(5) Remove the upper section of the main body.
Remove the four hole plugs and then remove the four hexagon socket head cap screws (M6 x 15) with a hexagon wrench (distance between the opposite sides: 5mm).
(The picture on the right shows one side only.)


Hexagon socket head cap screw (M6x15)

(6) Reassembly: Reassemble in the reverse order of disassembly.

<Attaching the Steam Gate>

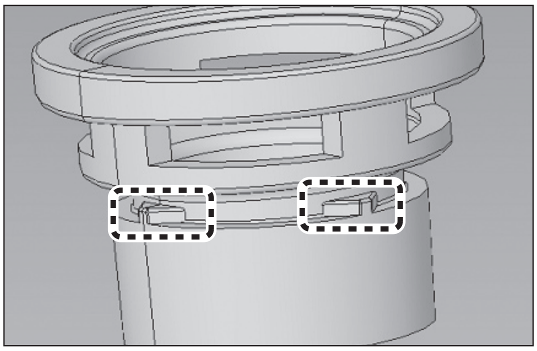
Attach the bottom of the steam gate while holding the top of the steam gate.


Steam gate (top)
Steam gate (bottom)

⚠CAUTION

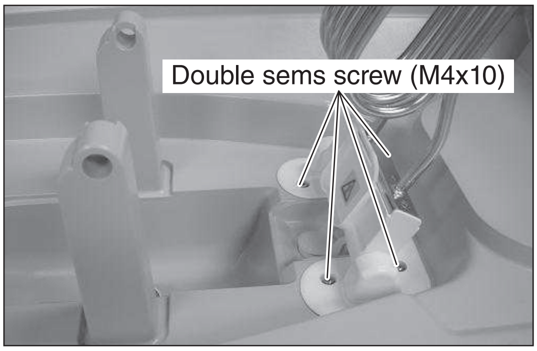
<Serial Number 2150556 or later>

- Take care that the hooks of the bottom of the steam gate do not interfere with the triangular shapes of the top of the steam gate when attaching.

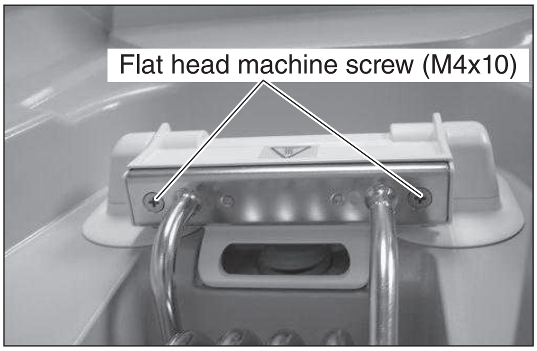


6-3-2. Replacing the Heater for the Main Body

(1) Remove the screws fixing the heater.
Remove the four protective stickers and then remove the four double sems screws (M4 x 10) with a Phillips screwdriver.

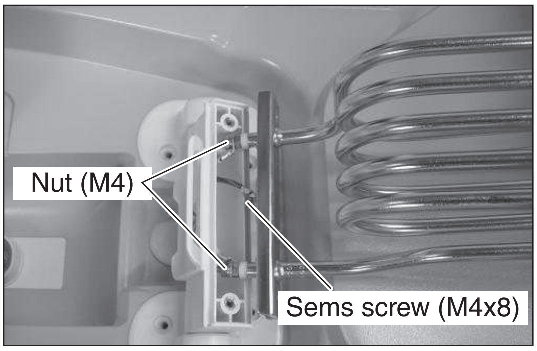

Double sems screw (M4x10)

(2) Remove the heater from the heater cover.
Remove the two flat head machine screws (M4 x 10) with a Phillips screwdriver.


Flat head machine screw (M4x10)

(3) Remove the heater cable and the earthing conductor.
Remove the sems screw (M4 x 8) with a Phillips screwdriver and then remove the two nuts (M4) with a box wrench (distance between the opposite sides: 7mm).

(4) Reassembly: Reassemble in the reverse order of disassembly.

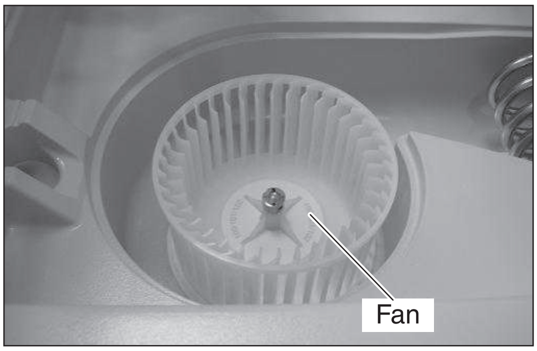


⚠CAUTION

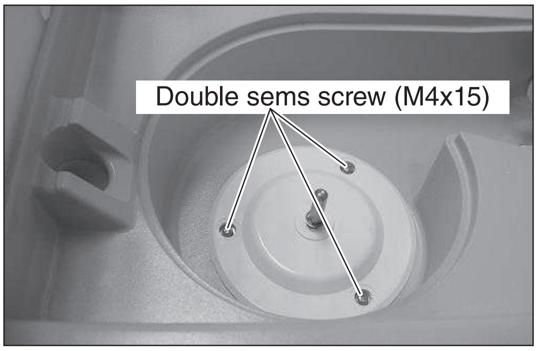
- Be sure to attach a new packing when replacing the heater.

6-3-3. Replacing the Fan Motor

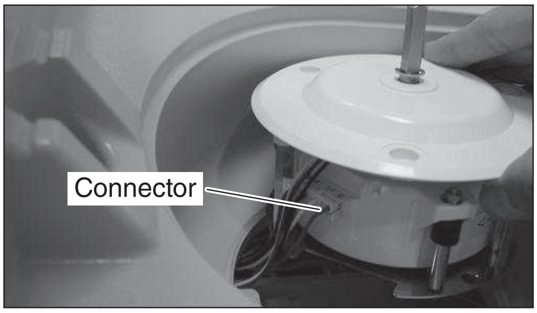
(1) Remove the fan.
Hold the fan with both your hands and pull it out along the shaft of the fan motor.

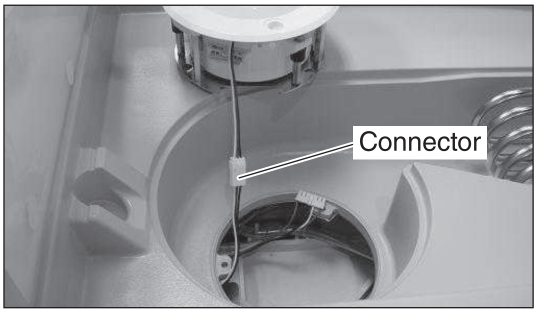


(2) Remove the screws fixing the fan motor.
Remove the three protective stickers and then remove the three double sems screws (M4 x 15) with a Phillips screwdriver.



(3) Pull up the fan motor toward you while turning it counterclockwise slightly. Remove the connectors of the fan motor and the position detection board.
Remove the packing from the site where the fan motor is attached on the main body.





(4) Reassembly: Reassemble in the reverse order of disassembly.
When reassembling the fan motor, be sure to attach the connector of the fan motor in the correct orientation and take care not to get the wires caught.

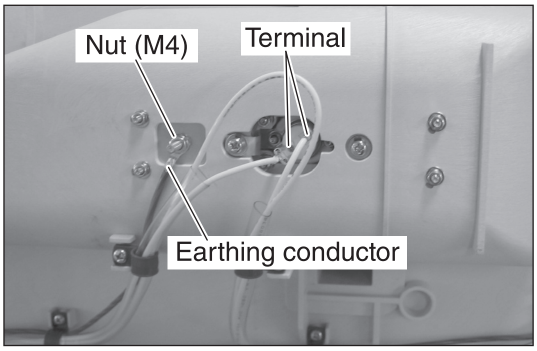
⚠CAUTION

- Be sure to attach a new packing when replacing the motor.

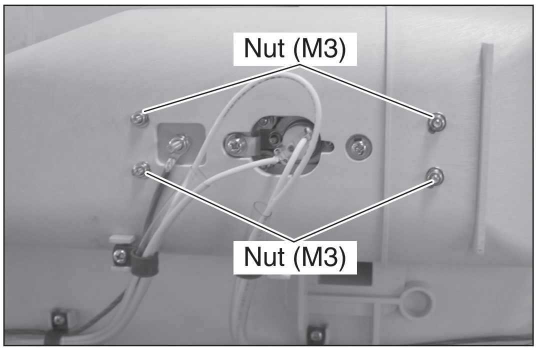
6-3-4. Replacing the High Temperature Sensor

(1) Remove the upper section of the main body from the main body.
Follow (1) ~ (5) in "6-3-1. "Removing the Upper Section of the Main Body from the Main Body."

(2) Remove the terminals connected to the high temperature sensor and the earthing conductor on the plate of the high temperature sensor.
Remove the nut (M4) with a box wrench (distance between the opposite sides: 7mm) and then remove the earthing conductor.



(3) Remove the screws fixing the high temperature sensor.
Remove the four nuts (M3) with a box wrench (distance between the opposite sides: 5.5mm). Remove the packing from the site where the high temperature sensor is attached on the main body.



(4) Reassembly: Reassemble in the reverse order of disassembly.

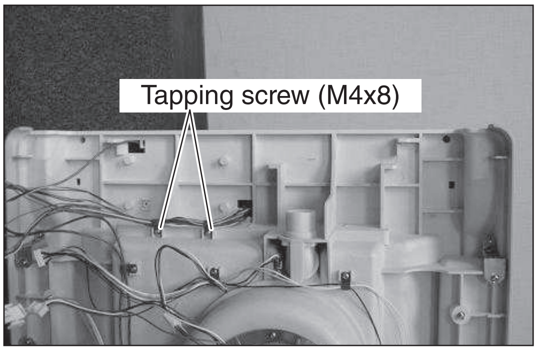
⚠CAUTION

- Be sure to attach a new packing when replacing the high temperature sensor.

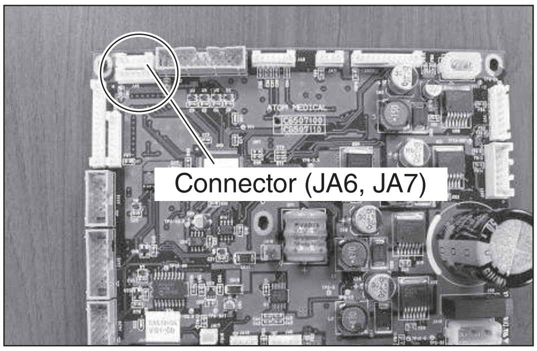
6-3-5. Replacing the Control Box Cover

(1) Remove the rear panel of the main body.
Follow (1) ~ (9) in “6-1-1. Removing the Main Body from the Stand.”

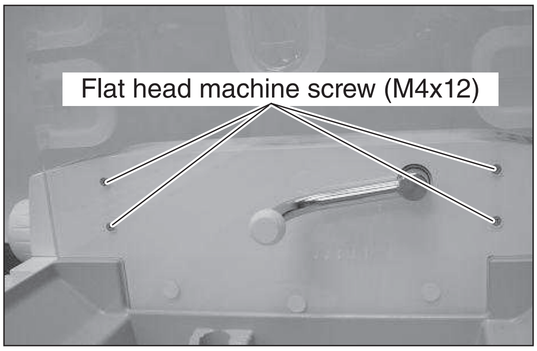
(2) Remove the cable clamps.
Remove the two tapping screws (M4 x 8) with a Phillips screwdriver.



(3) Remove the connectors from the main board.
If the unit contains the SpO2 module, follow (2) and (3) in “6-4-1. Replacing the Main Board.”
Remove the connectors JA6 and JA7 from the switch board.
For details, see “[8] Wiring Diagram.”



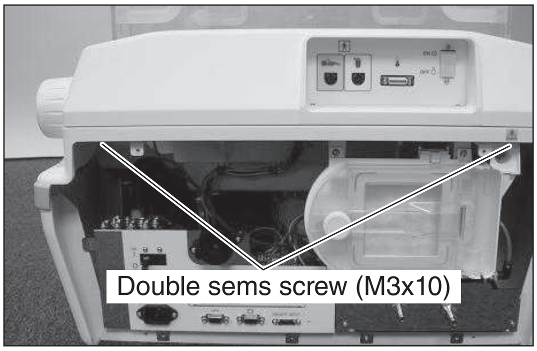
(4) Remove the control box cover from the hood.
Remove the four stickers and then remove the four flat head machine screws (M4 x 12) from the hood with a Phillips screwdriver.



⚠CAUTION

- The flat head machine screws are coated with a locking agent. If you cannot remove the screws, heat the heads of the screws with a dryer (with a 1000 watt dryer for about 6 minutes), then remove them.
- Be careful not to melt any plastic components when heating the screws.

(5) Remove the control box cover from the upper section of the main body.
Remove the two double sems screws (M3 x 10) from the upper section of the main body with a Phillips screwdriver.

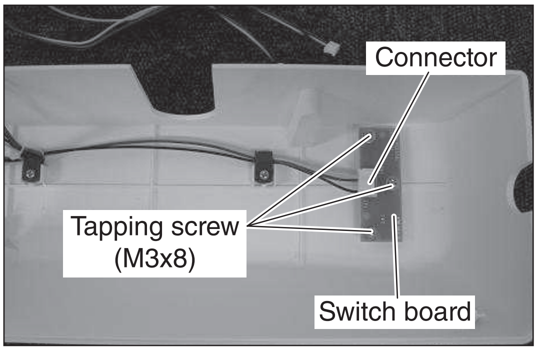


(6) Reassembly: Reassemble in the reverse order of disassembly.

6-3-6. Replacing the Switch Board

(1) Remove the control box cover.
Follow (1) ~ (5) in “6-3-5. Replacing the Control Box Cover.”

(2) Pull out the connector of the switch board and remove the switch board.
Remove the three tapping screws (M3 x 8) with a Phillips screwdriver.

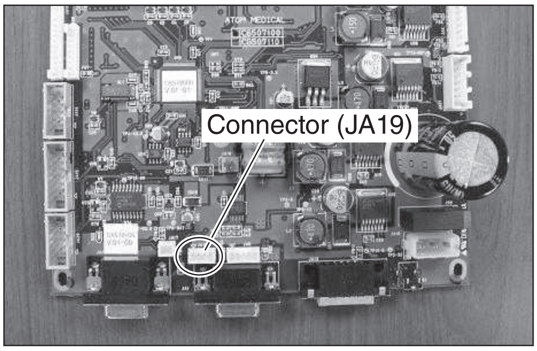


(3) Reassembly: Reassemble in the reverse order of disassembly.

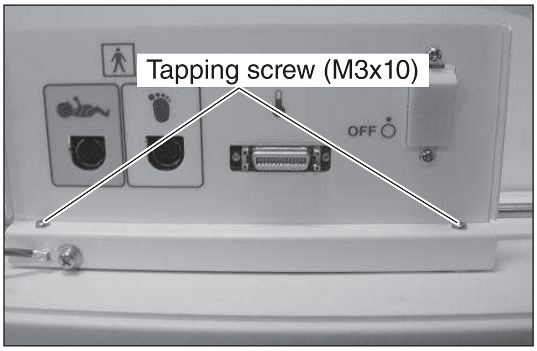
6-3-7. Replacing the Power Switch

(1) Remove the control box cover.
Follow (1) ~ (5) in “6-3-5. Replacing the Control Box Cover.”

(2) Remove the connector from the main board.
Remove the connector JA19 from the main board.
For details, see “[8] Wiring Diagram.”

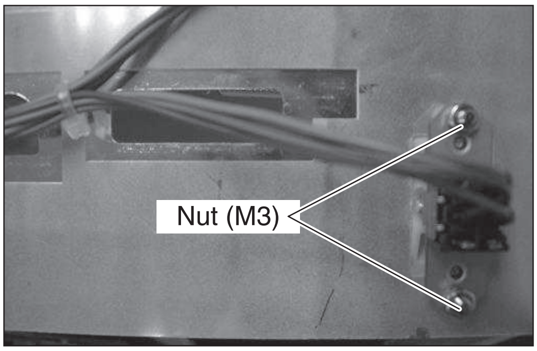


(3) Remove the plate.
Remove the two tapping screws (M3 x 10) with a Phillips screwdriver.



(4) Remove the power switch.
Remove the two nuts (M3) with a box wrench (distance between the opposite sides: 5.5mm).

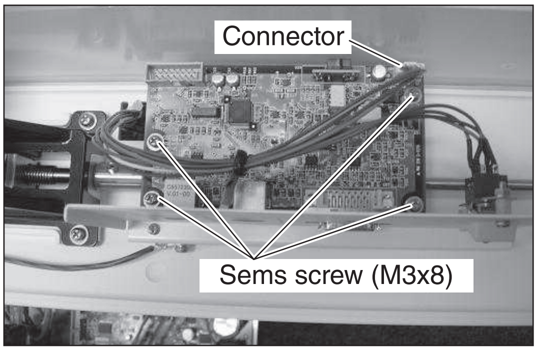
(5) Reassembly: Reassemble in the reverse order of disassembly.



6-3-8. Replacing the Detection Board

(1) Remove the control box cover.
Follow (1) ~ (5) in “6-3-5. Replacing the Control Box Cover.”

(2) Remove the detection board.
Remove the connector JD1 from the detection board and then remove the four sems screws (M3 x 8) with a Phillips screwdriver.

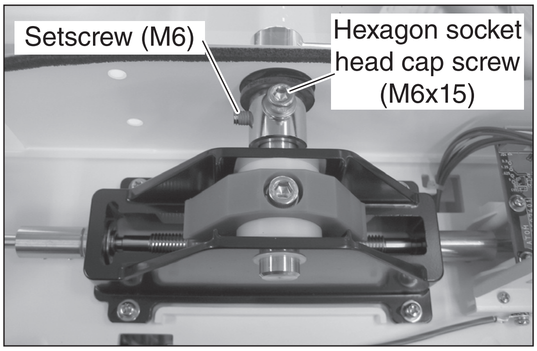


(3) Reassembly: Reassemble in the reverse order of disassembly.

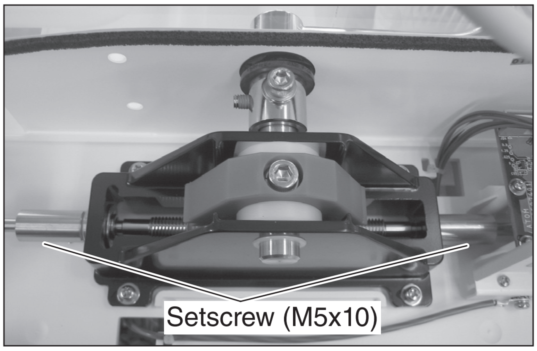
6-3-9. Replacing the Tilting Unit

(1) Remove the control box cover.
Follow (1) ~ (5) in “6-3-5. Replacing the Control Box Cover.”

(2) Remove the tilting arm.
Remove the hexagon socket head cap screw (M6x15) with a hexagon wrench (distance between the opposite sides: 5mm), and also remove the setscrew (M6) with a hexagon wrench (distance between the opposite sides: 3mm). Then move the tilting arm fixing ring toward the tilting unit.

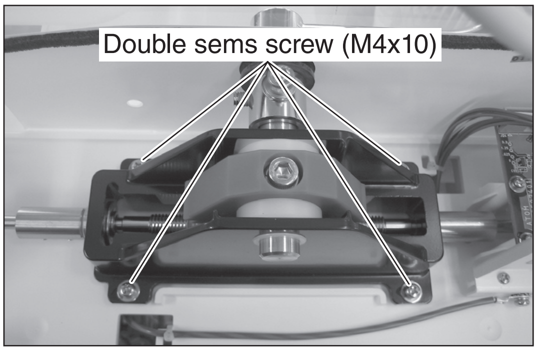


(3) Remove the tilting knobs.
Remove the two setscrews (M5 x 10) with a hexagon wrench (distance between the opposite sides: 2.5mm).



(4) Remove the tilting unit.
Remove the four double sems screws (M4 x 10) with a Phillips screwdriver.

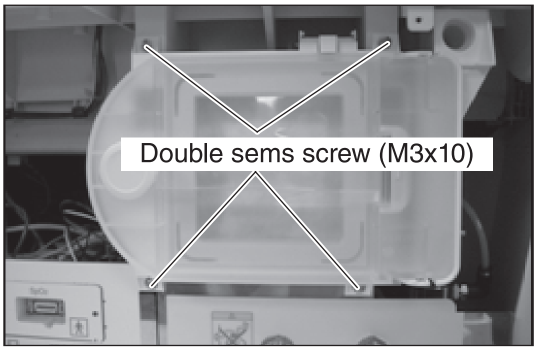
(5) Reassembly: Reassemble in the reverse order of disassembly.



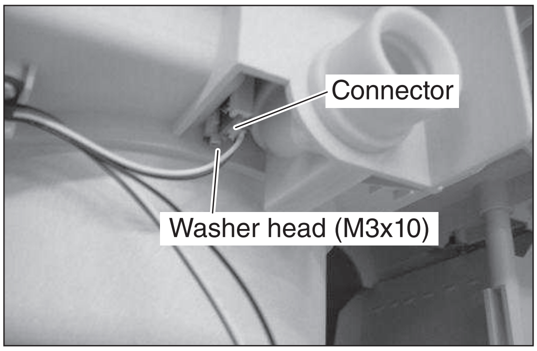
6-3-10. Replacing the Position Detection Board (for the Detection of the Middle Board)

(1) Remove the rear panel of the main body.
Follow (1) ~ (9) in "6-1-1. Removing the Main Body from the Stand."

(2) Remove the filter assembly.
Remove the four double sems screws (M3 x 10) with a Phillips screwdriver. Remove the pipe of the oxygen supply valve and the connector of the position detection board of the filter assembly.



(3) Remove the position detection board.
Remove the washer head (M3 x 10) with a Phillips screwdriver and then remove the connector.

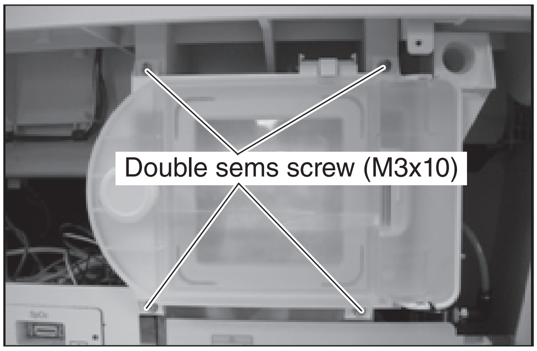


(4) Reassembly: Reassemble in the reverse order of disassembly.

6-3-11. Replacing the Filter Joint

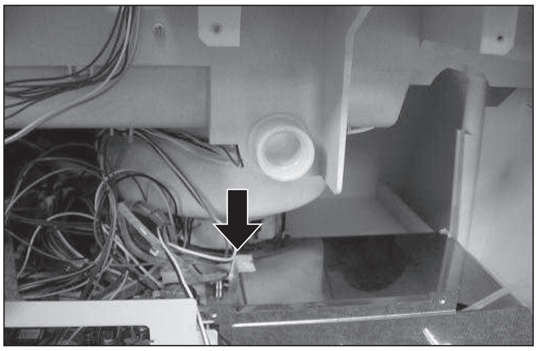
(1) Remove the rear panel of the main body.
Follow (1) ~ (9) in "6-1-1. Removing the Main Body from the Stand."

(2) Remove the filter assembly.
Remove the four double sems screws (M3 x 10) with a Phillips screwdriver. Remove the pipe of the oxygen supply valve and the connector of the position detection board of the filter assembly.



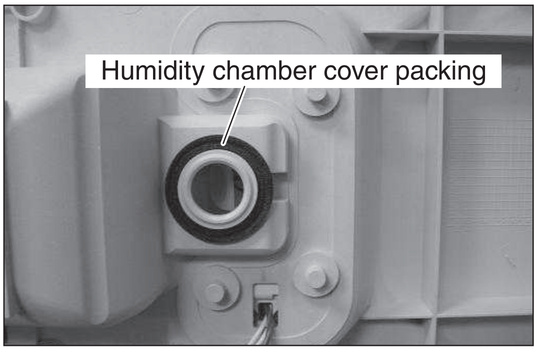
(3) Remove the filter joint.
Remove the filter joint from behind the ripple in the direction as shown by the arrow in the picture on the right.

(4) Reassembly: Reassemble in the reverse order of disassembly.



6-3-12. Replacing the Humidity Chamber Cover Packing

(1) Remove the upper section of the main body from the main body.
Follow (1) ~ (5) in “6-3-1. “Removing the Upper Section of the Main Body from the Main Body.”



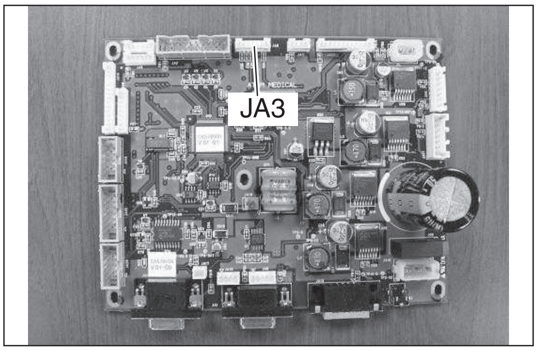
(2) Remove the humidity chamber cover packing from the upper section of the main body.

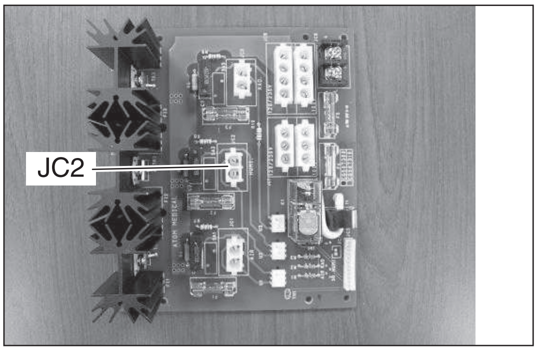
(3) Reassembly: Reassemble in the reverse order of disassembly.

6-3-13. Replacing the Humidity Chamber Cradle

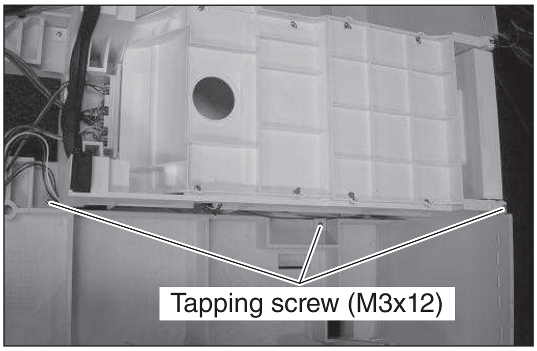
(1) Remove the upper section of the main body from the main body.
Follow (1) ~ (5) in “6-3-1. Removing the Upper Section of the Main Body from the Main Body.”

(2) Remove the wiring.
Remove the connector JA3 from the main board and the connector JC2 from the heater control board. Remove the sems screw (M4x8) fixing the earthing terminal of the humidifying heater cable with a Phillips screwdriver. Cut the tie wrap fixing the removed wires.
For details, see “[8] Wiring Diagram.”





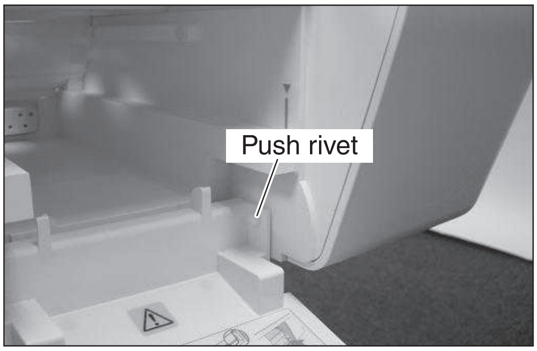
(3) Remove the humidity chamber cradle.
Remove the six tapping screws (M3 x 12) with a Phillips screwdriver.
(The picture on the right shows one side only.)
Pull up the humidity chamber cradle and remove the connectors of the position detection boards (for the detection of the humidity chamber cover and the boiler cap).



(4) Reassembly: Reassemble in the reverse order of disassembly.

6-3-14. Replacing the Humidity Chamber Cover

(1) Open the humidity chamber cover and remove the two push rivets.
(The picture on the right shows one side only.)

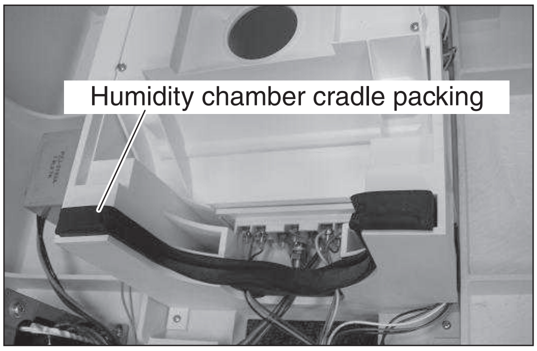


(2) Reassembly: Reassemble in the reverse order of disassembly.

6-3-15. Replacing the Humidity Chamber Cradle Packing

(1) Remove the upper section of the main body from the main body.
Follow (1) ~ (5) in “6-3-1. Removing the Upper Section of the Main Body from the Main Body.”

(2) Remove the humidity chamber cradle packing.

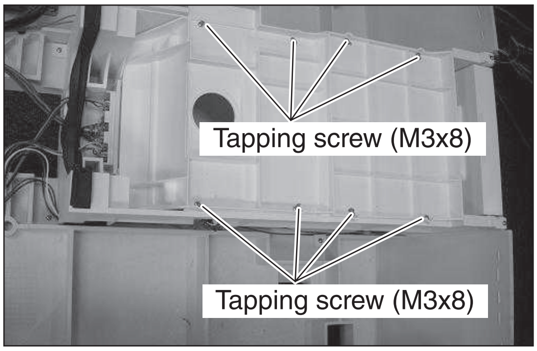


(3) Reassembly: Reassemble in the reverse order of disassembly.

6-3-16. Replacing the Humidity Chamber Connector

(1) Remove the upper section of the main body from the main body and then remove the wiring.
Follow (1) and (2) in “6-3-13. Replacing the Humidity Chamber Cradle.”

(2) Remove the humidity chamber cover.
Remove the eight tapping screws (M3 x 8) with a Phillips screwdriver.



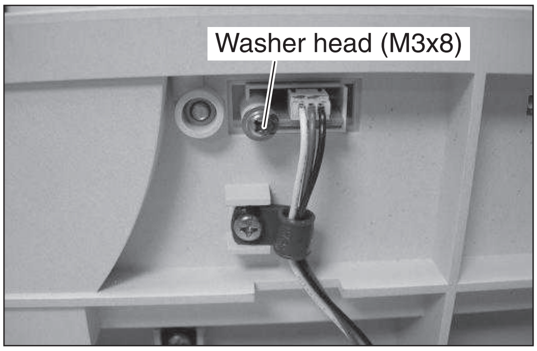
(3) Remove the humidity chamber cradle packing and then remove the humidity chamber connector.

(4) Reassembly: Reassemble in the reverse order of disassembly.

6-3-17. Replacing the Position Detection Board (for the Detection of the Boiler Cap)

(1) Remove the humidity chamber cradle from the upper section of the main body.
Follow (1) ~ (3) in "6-3-13. Replacing the Humidity Chamber Cradle."

(2) Remove the position detection board.
Remove the washer head (M3 x 8) with a Phillips screwdriver.

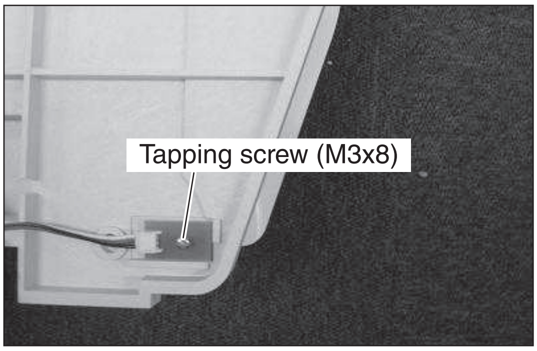


(3) Reassembly: Reassemble in the reverse order of disassembly.

6-3-18. Replacing the Position Detection Board (for the Detection of the Humidity Chamber Cover)

(1) Remove the humidity chamber cradle assembly from the upper section of the main body.
Follow (1) ~ (3) in "6-3-13. Replacing the Humidity Chamber Cradle."

(2) Remove the position detection board.
Remove the tapping screw (M3 x 8) with a Phillips screwdriver.

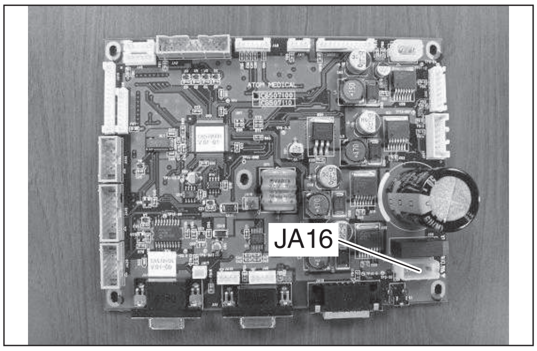


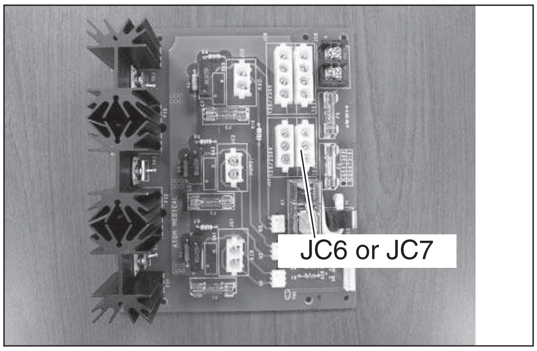
(3) Reassembly: Reassemble in the reverse order of disassembly.

6-3-19. Replacing the Control Power Transformer

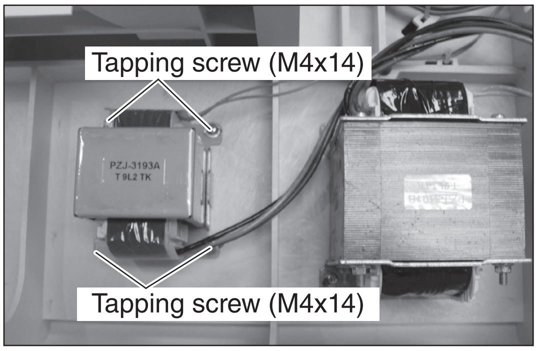
(1) Remove the upper section of the main body from the main body.
Follow (1) ~ (5) in "6-3-1. Removing the Upper Section of the Main Body from the Main Body."

(2) Remove the wiring.
Remove the connector JA16 from the main board and the connector JC6 (100V) or JC7 (120V/230V) from the heater control board.
Cut the tie wrap fixing the removed wires.
For details, see "[8] Wiring Diagram."





(3) Remove the control power transformer.
Remove the four tapping screws (M4 x 14) with a Phillips screwdriver.

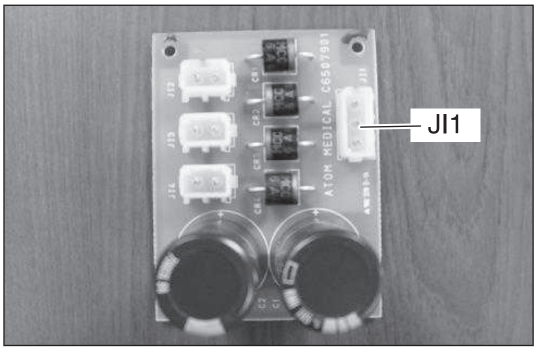


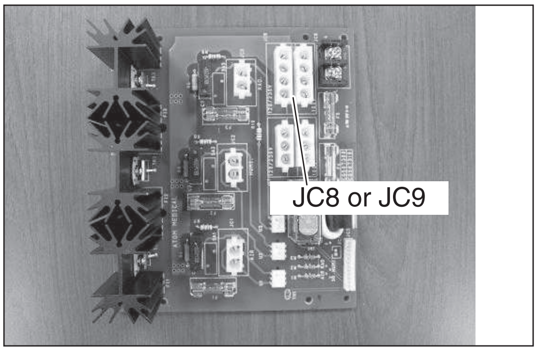
(4) Reassembly: Reassemble in the reverse order of disassembly.

6-3-20. Replacing the Drive Power Transformer

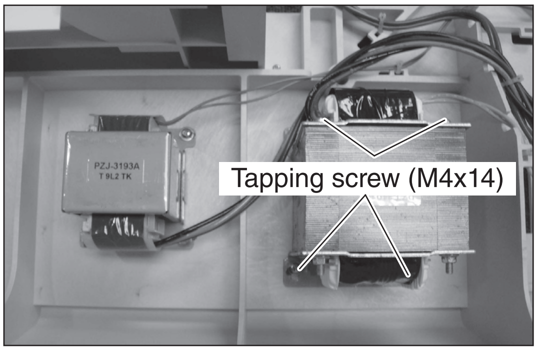
(1) Remove the upper section of the main body from the main body.
Follow (1) ~ (5) in "6-3-1. Removing the Upper Section of the Main Body from the Main Body."

(2) Remove the wiring.
Remove the connector JI1 from the rectifier board and the connector JC8 (100V) or JC9 (120V/230V) from the heater control board.
Cut the tie wrap fixing the removed wires.
For details, see "[8] Wiring Diagram."





(3) Remove the drive power transformer.
Remove the four tapping screws (M4 x 14) with a Phillips screwdriver.

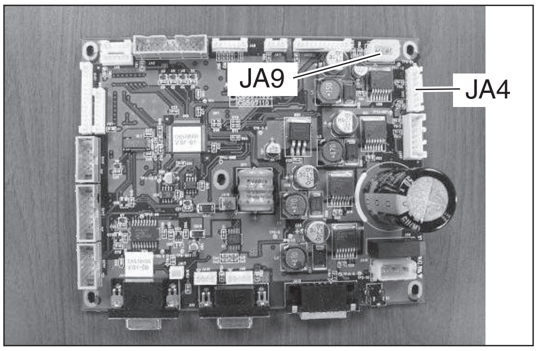


(4) Reassembly: Reassemble in the reverse order of disassembly.

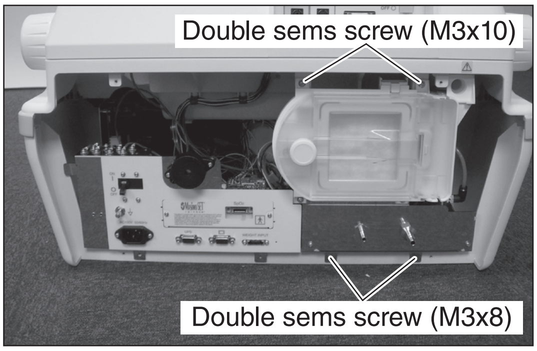
6-3-21. Replacing the Oxygen Controller

(1) Remove the rear panel of the main body.
Follow (1) ~ (9) in "6-1-1. Removing the Main Body from the Stand."

(2) Remove the connectors from the main board.
Remove the connectors JA4 and JA9 from the main board.
For details, see "[8] Wiring Diagram."



(3) Remove the screws fixing the oxygen controller.
Remove the two double sems screws (M3 x 8) with a Phillips screwdriver. Remove the two double sems screws (M3 x 10) on the filter assembly and then pull out the filter assembly and the oxygen controller from the main body.



(4) Remove the filter assembly from the oxygen controller.
Remove the two double sems screws (M3x10) with a Phillips screwdriver.

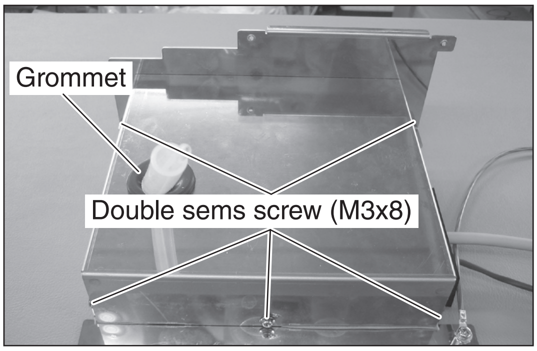
(5) Remove the piping of the oxygen supply valve.

(6) Reassembly: Reassemble in the reverse order of disassembly.

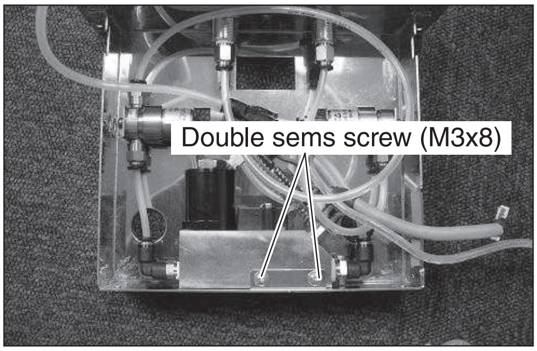
6-3-22. Replacing the Mass Flow Valve

(1) Remove the oxygen controller.
Follow (1) ~ (4) in “6-3-21. Replacing the Oxygen Controller.”

(2) Remove the cover.
Remove the grommet from the cover and then remove the five double sems screws (M3 x 8) with a Phillips screwdriver.



(3) Remove the pipes and the mass flow valve.
Remove the two double sems screws (M3 x 8) with a Phillips screwdriver.

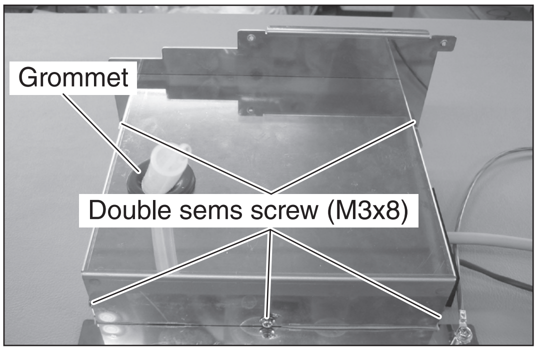


(4) Reassembly: Reassemble in the reverse order of disassembly.

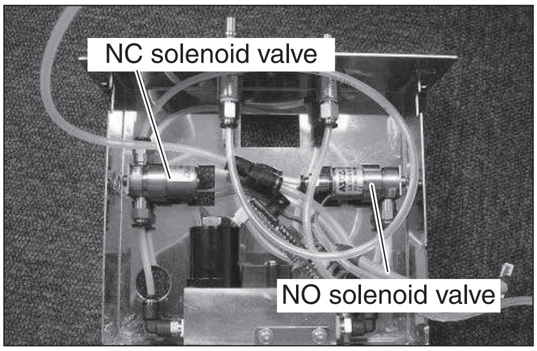
6-3-23. Replacing the Solenoid Valve

(1) Remove the oxygen controller.
See (1) ~ (5) in “6-3-21. Replacing the Oxygen Controller.”

(2) Remove the cover.
Remove the grommet from the cover and then remove the five double sems screws (M3 x 8) with a Phillips screwdriver.



(3) Remove the pipes and the solenoid valve.
The solenoid valve on the left is a normal closed (NC) type (with joint). The solenoid valve on the right is a normal open (NO) type (with joint).
Remove the two double sems screws (M4 x 8) of each solenoid valve with a Phillips screwdriver.



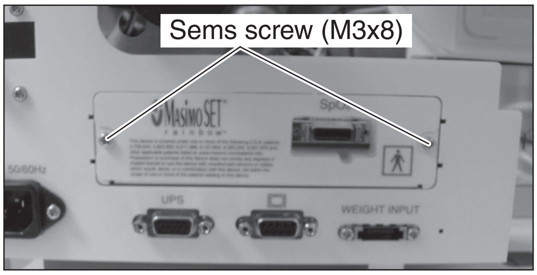
(4) Reassembly: Reassemble in the reverse order of disassembly.

6-4. Power Unit

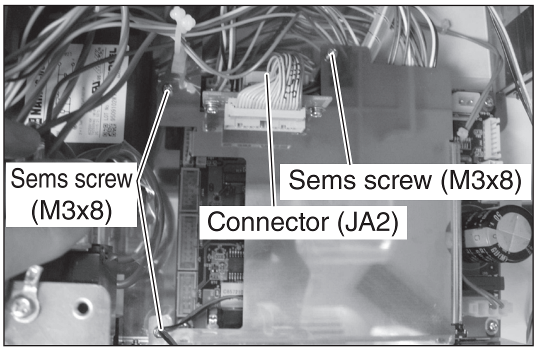
6-4-1. Replacing the Main Board

(1) Pull out the power box.
Follow (1) ~ (11) in "6-1-1. Removing the Main Body from the Stand."

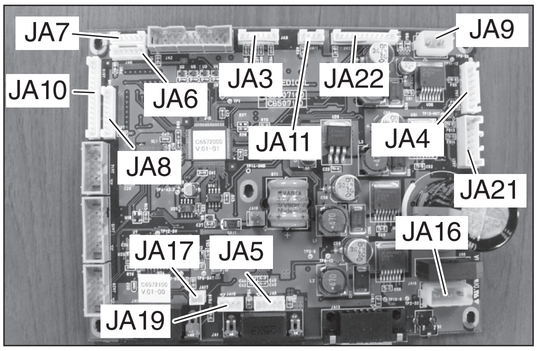
(2) Remove the SpO2 unit (Masimo).
Remove the two sems screws (M3 x 8) with a Phillips screwdriver.


Sems screw (M3x8)

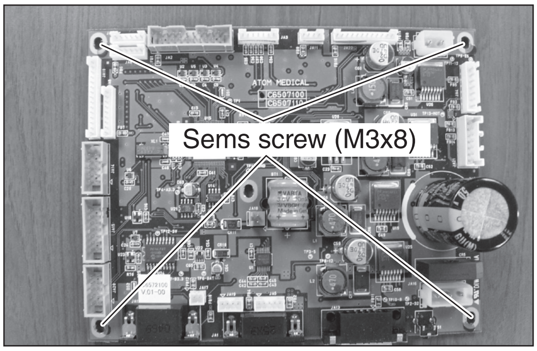
(3) Remove the SpO2 slide plate.
Remove the connector JA2 from the main board.
Remove the three sems screws (M3 x 8) with a Phillips screwdriver.

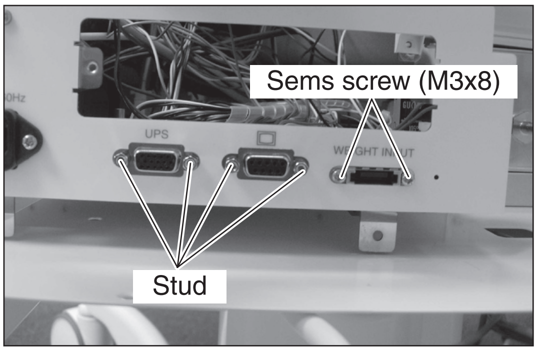

Sems screw
(M3x8)
Sems screw (M3x8)
Connector (JA2)

(4) Remove the connectors JA3, JA4, JA5, JA6, JA7, JA8, JA9, JA10, JA11, JA16, JA17, JA19, JA21 and JA22 from the main board.
For details, see "[8] Wiring Diagram."


JA7
JA9
JA10
JA6
JA3
JA22
JA11
JA4
JA8
JA21
JA16
JA17
JA5
JA19

(5) Remove the main board.
Remove the four sems screws (M3 x 8) with a Phillips screwdriver.
Remove the four studs on the connectors for the Power Pack *i* (UPS) and the display with a box wrench (distance between the opposite sides: 5mm) from the display side. Remove the two sems screws (M3 x 8) on the connector for the weight monitor with a Phillips screwdriver.


Sems screw (M3x8)


Sems screw (M3x8)
Stud

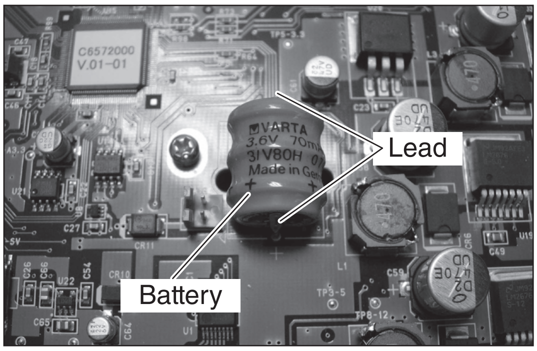
(6) Reassembly: Reassemble in the reverse order of disassembly.

(7) After reassembling, perform various setting procedures on the display.

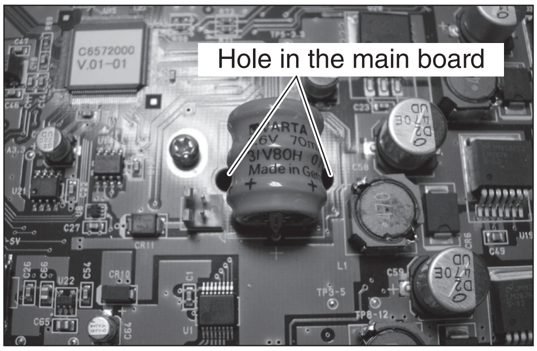
6-4-2. Replacing the Battery for Power Failure Alarm

(1) Remove the main board.
Follow (1) ~ (5) in "6-4-1. Replacing the Main Board."

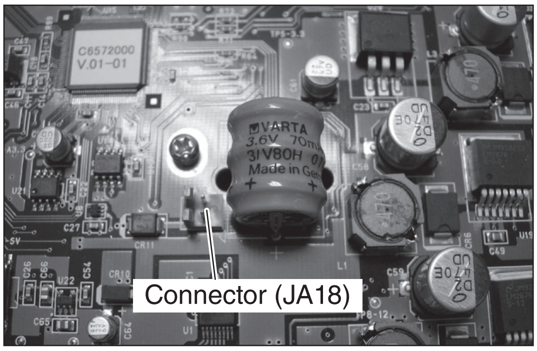
(2) Remove the battery.
Cut the two leads of the battery soldered on the main board with pliers.



(3) Fix a new battery to the main board.
Fix a new battery with a tie wrap inserted into the two holes in the main board.



(4) Connect the connector of the new battery to the main board.
Connect the connector of the new battery to the connector JA 18 on the main board.



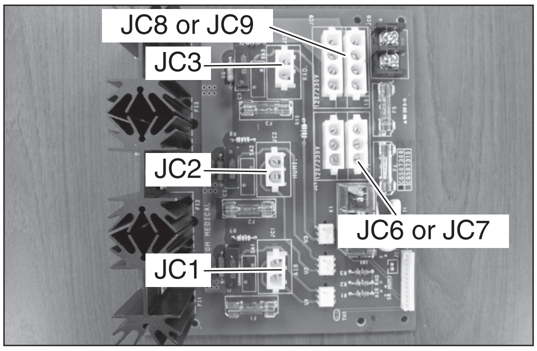
(5) Reassembly: Reassemble in the reverse order of disassembly.

6-4-3. Replacing the Heater Control Board

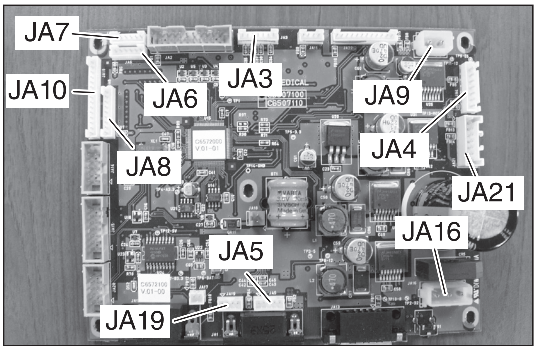
(1) Remove the SpO2 slide plate.
Follow (1) ~ (3) in "6-4-1. Replacing the Main Board."

(2) Remove the power box.
Remove the following connectors connected to the boards below.
For details, see "[8] Wiring Diagram."

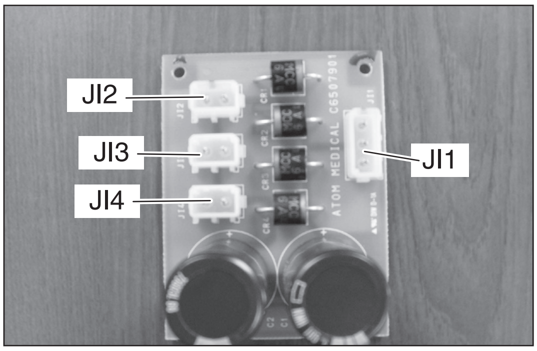
<Heater control board>
JC1, JC2, JC3
JC6: 100V or JC7: 120V/230V
JC8: 100V or JC9: 120V/230V


JC8 or JC9
JC3
JC2
JC6 or JC7
JC1

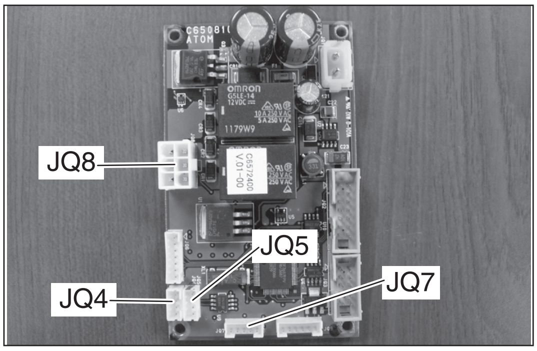
<Main board>
JA3, JA4, JA5, JA6, JA7, JA8, JA9, JA10, JA16, JA19, JA21


JA7
JA10
JA6
JA3
JA9
JA4
JA8
JA21
JA16
JA5
JA19

<Rectifier board>
JI1, JI2, JI3, JI4


JI2
JI3
JI1
JI4

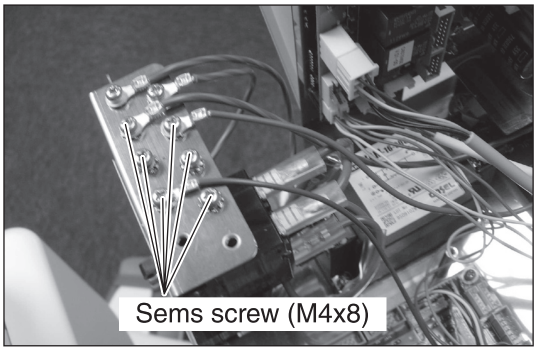
<Hi-Low drive board>
JQ4, JQ5, JQ7, JQ8


JQ8
JQ5
JQ4
JQ7

Remove the coating clip on the side of the power box plate.

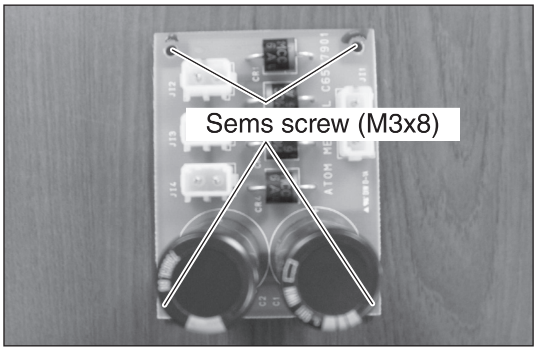
<Protective earthing terminal>

Remove the sems screws (M4 x 8) fixing the earthing terminals of the radiant warmer, the upper section of the main body, the oxygen controller, the high temperature sensor, the warming heater and the humidifying heater with a Phillips screwdriver.

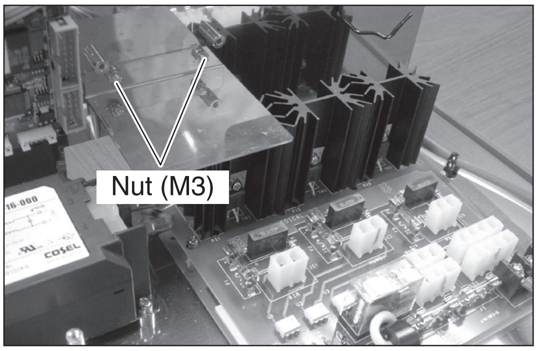


Pull out the power box.

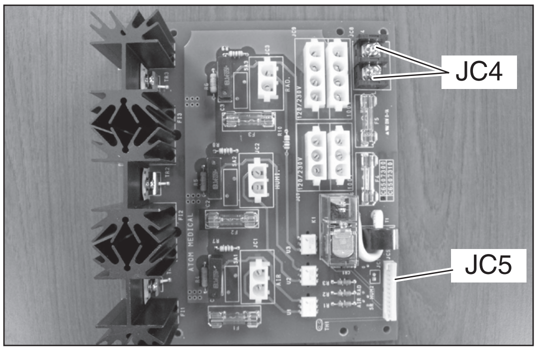
(3) Remove the rectifier board.
Remove the four sems screws (M3 x 8).



(4) Remove the capacitor cover.
Remove the two nuts (M3) with a box wrench (distance between the opposite sides: 5.5mm).



(5) Remove the heater control board.
Remove the connector JC5 from the heater control board.
Remove the two terminals of the terminal block JC4 of the heater control board with a Phillips screwdriver.
For details, see “[8] Wiring Diagram.”

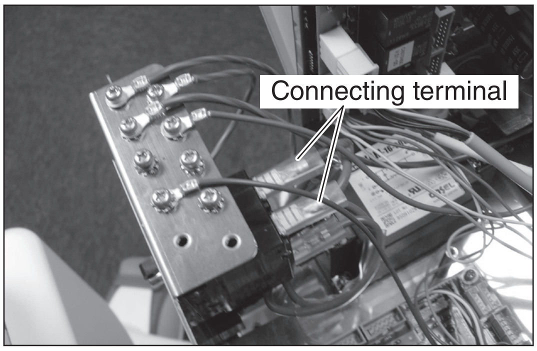


(6) Reassembly: Reassemble in the reverse order of disassembly.

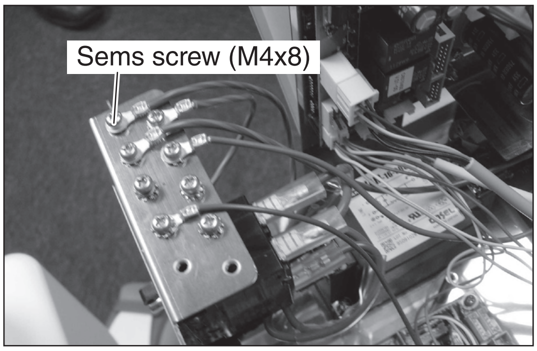
6-4-4. Replacing the AC Inlet

(1) Pull out the power box.
Follow (1) ~ (11) in “6-1-1. Removing the Main Body from the Stand.”

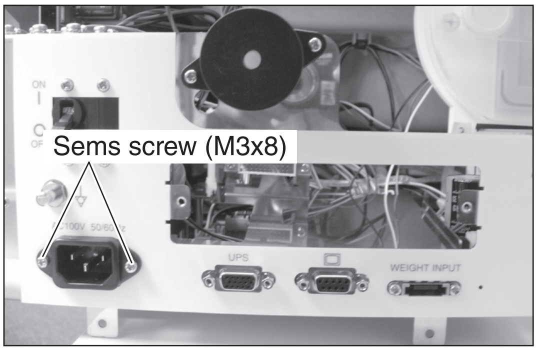
(2) Remove the connecting terminals of the AC inlet.
Pull out the two connecting terminals of the AC inlet connected to the circuit breaker.



(3) Remove the protective earthing terminal of the AC inlet.
Remove the sems screw (M4 x 8) fixing the protective earthing terminal of the AC inlet connected to the power box with a Phillips screwdriver.
For details, see “[8] Wiring Diagram.”



(4) Remove the AC inlet from the power box.
Remove the two sems screws (M3 x 8) with a Phillips screwdriver.

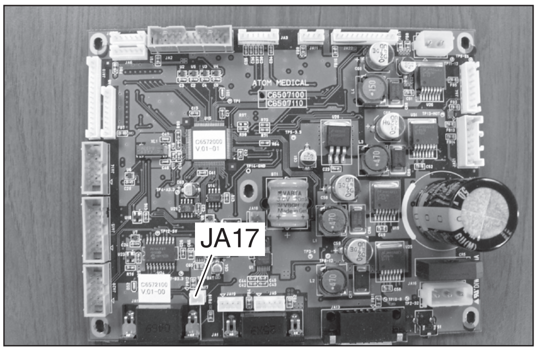


(5) Reassembly: Reassemble in the reverse order of disassembly.

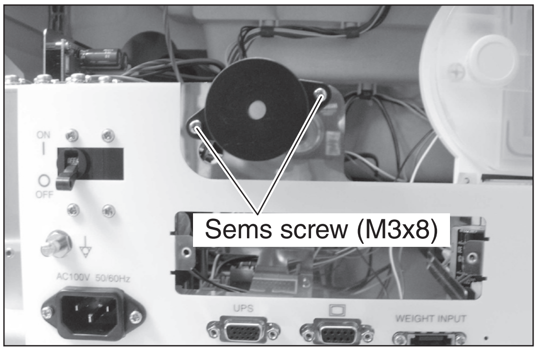
6-4-5. Replacing the Buzzer

(1) Pull out the power box and then remove the SpO2 slide plate.
Follow (1) in “6-4-3. Replacing the Heater Control Board.”

(2) Remove the connector from the main board.
Remove the connector JA17 from the main board.



(3) Remove the buzzer from the power box.
Remove the two sems screws (M3 x 8) with a Phillips screwdriver.

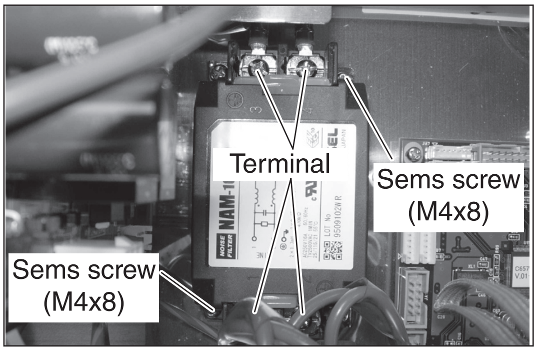

Sems screw (M3x8)
ON
OFF
AC100V 50/60Hz
UPS
WEIGHT INPUT

(4) Reassembly: Reassemble in the reverse order of disassembly.

6-4-6. Replacing the Noise Filter

(1) Remove the power box.
Follow (1) and (2) in "6-4-3. Replacing the Heater Control Board."

(2) Remove the noise filter.
Open the cover of the terminal block of the noise filter. Remove the two terminals fixed to the terminal block with a Phillips screwdriver.
Remove the two sems screws (M4 x 8) with a Phillips screwdriver.

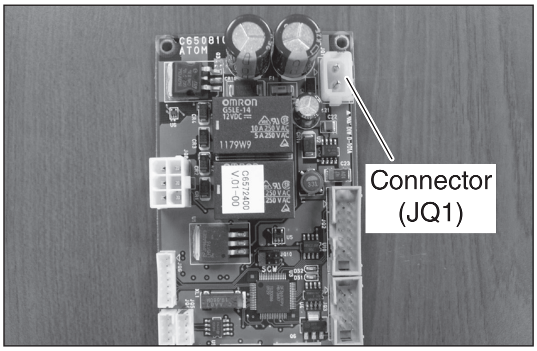

Terminal
Sems screw (M4x8)
Sems screw (M4x8)

(3) Reassembly: Reassemble in the reverse order of disassembly.

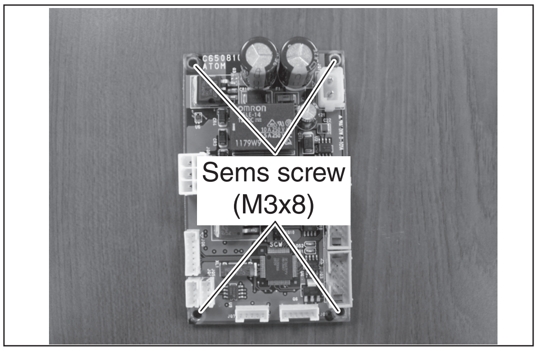
6-4-7. Replacing the Hi-Low Drive Board

(1) Remove the power box.
Follow (1) and (2) in "6-4-3. Replacing the Heater Control Board."

(2) Remove the connector from the Hi-Low drive board.
Remove the connector JQ1 from to the Hi-Low drive board.


Connector (JQ1)

(3) Remove the Hi-Low drive board.
Remove the four sems screws (M3 x 8) with a Phillips screwdriver.

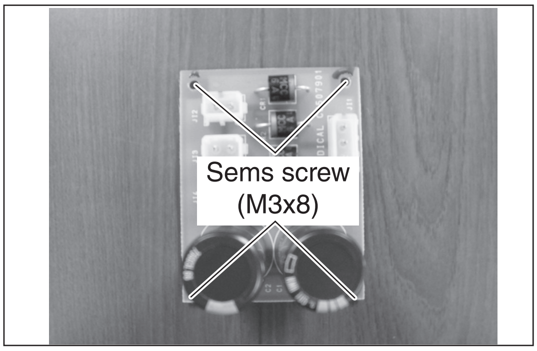


(4) Connect the jumper pin to the "S" of JQ10 on a new Hi-Low drive board to use.

(5) Reassembly: Reassemble in the reverse order of disassembly.

6-4-8. Replacing the Rectifier Board

(1) Remove the rectifier board.
Follow (1) ~ (3) in "6-4-3. Replacing the Heater Control Board."

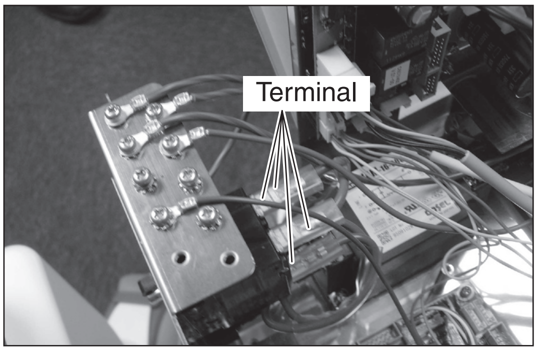


(2) Reassembly: Reassemble in the reverse order of disassembly.

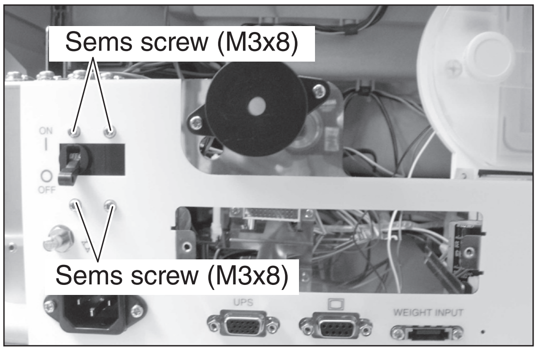
6-4-9. Replacing the Circuit Breaker

(1) Pull out the power box.
Follow (1) ~ (11) in "6-1-1. Removing the Main Body from the Stand."

(2) Remove the connecting terminals of the circuit breaker.
Remove the four connecting terminals connected to the circuit breaker.



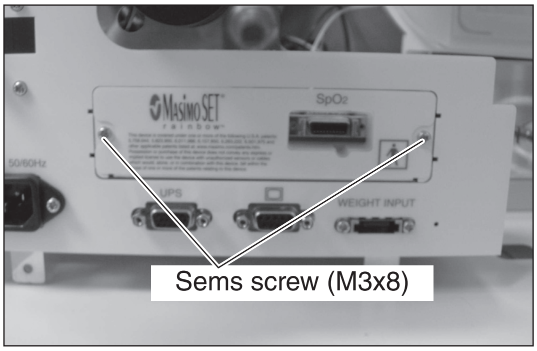
(3) Remove the circuit breaker.
Remove the four sems screws (M3 x 8) with a Phillips screwdriver.


Sems screw (M3x8)
ON
OFF
Sems screw (M3x8)
UPS
WEIGHT INPUT

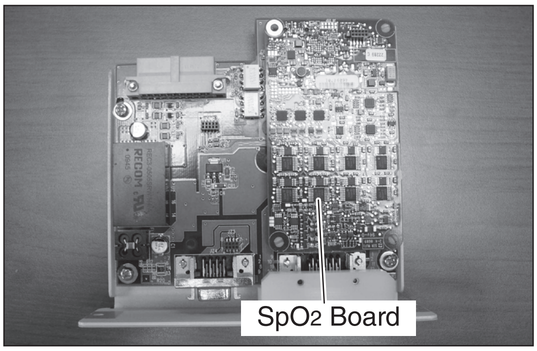
(4) Reassembly: Reassemble in the reverse order of disassembly.

6-4-10. Replacing the Insulating Board for SpO2 Unit

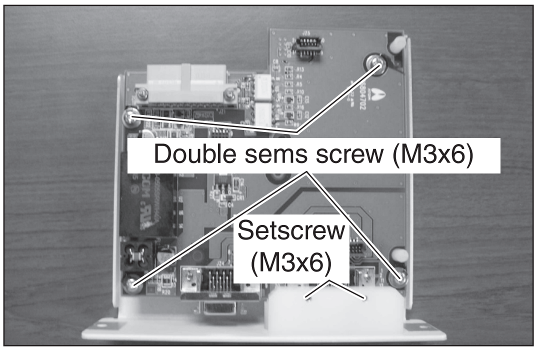
(1) Remove the pulse oximeter from the power box.
Remove the two sems screws (M3 x 8) with a Phillips screwdriver and pull out the pulse oximeter.


Masimo SET rainbow
SpO2
50/60Hz
UPS
WEIGHT INPUT
Sems screw (M3x8)

(2) Remove the SpO2 Board.
Remove the SpO2 Board from the pulse oximeter



(3) Remove the insulating board for SpO2 unit.
Loosen the two setscrews (M3 x 6) with a hexagon wrench. Remove the four double sems screws (M3 x 6) with a Phillips screwdriver.


Double sems screw (M3x6)
Setscrew
(M3x6)

(4) Reassembly: Reassemble in the reverse order of disassembly.

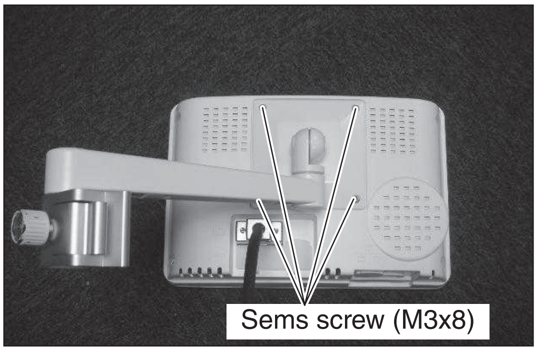
⚠CAUTION

- Take care not to get the buzzer cables caught when attaching the pulse oximeter to the power box.

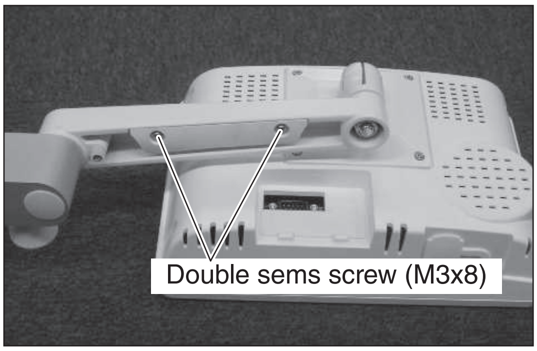
6-5. Display

6-5-1. Replacing the F-Rail Arm

(1) Remove the screws fixing the display and the arm.
Remove the four sems screws (M3 x 8) with a Phillips screwdriver.



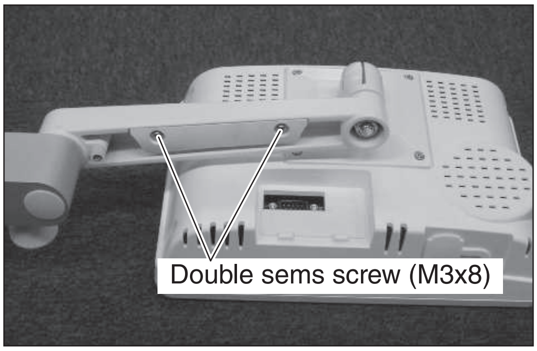
(2) Remove the screws fixing the cable guide.
Remove the two double sems screws (M3 x 8) with a Phillips screwdriver.



(3) Reassembly: Reassemble in the reverse order of disassembly.

6-5-2. Replacing the Cable Guide

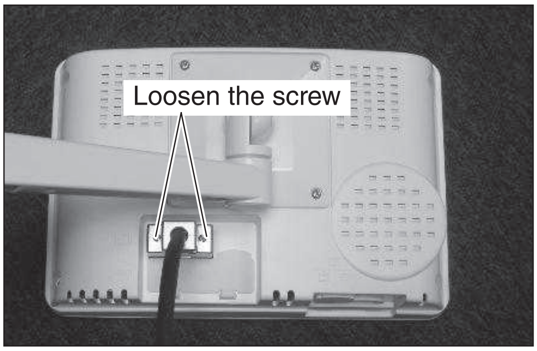
(1) Remove the screws fixing the cable guide.
Remove the two double sems screws (M3 x 8) with a Phillips screwdriver.



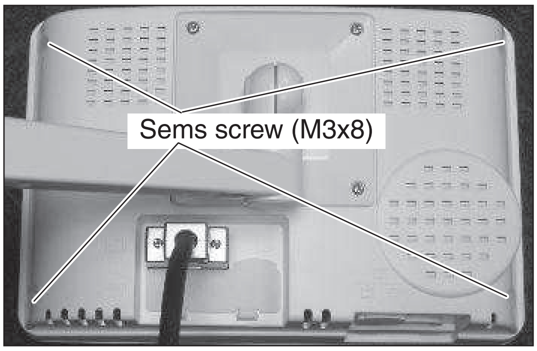
(2) Reassembly: Reassemble in the reverse order of disassembly.

6-5-3. Replacing the Front Panel

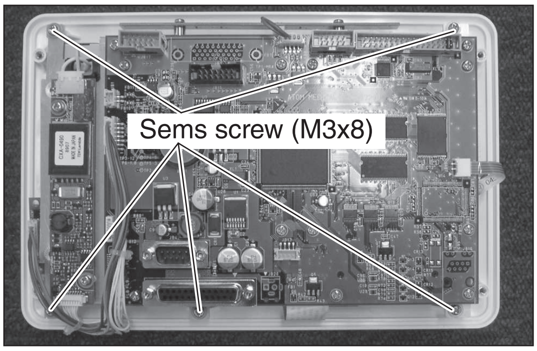
(1) Remove the cable.
Loosen the two screws fixing the cable with a small Phillips screwdriver and remove the cable.



(2) Remove the rear panel.
Remove the four sems screws (M3 x 8) with a Phillips screwdriver.



(3) Remove the LCD display, the LCD display board and the CCFL inverter together with the chassis from the front panel.
Remove the five sems screws (M3 x 8) with a Phillips screwdriver.



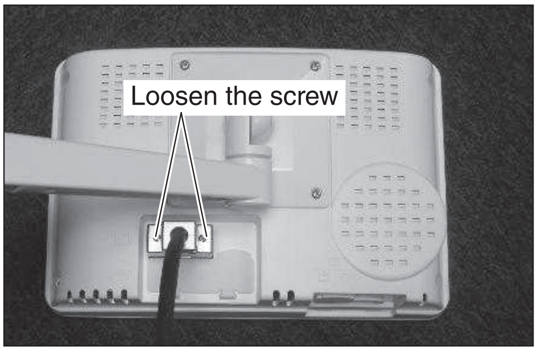
(4) Reassembly: Reassemble in the reverse order of disassembly.

⚠CAUTION

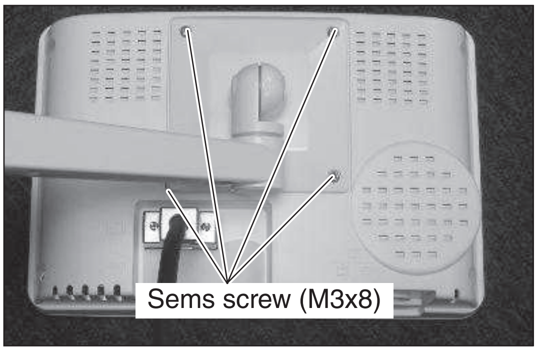
- ● Take care not to get the cable caught. Insert a silicone tube (Ø2) into the groove around the front panel.

6-5-4. Replacing the Rear Panel (with Alarm Lamp)

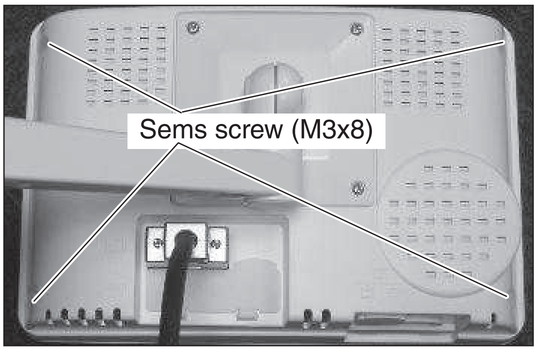
(1) Remove the cable.
Loosen the two screws fixing the cable with a small Phillips screwdriver and remove the cable.


Loosen the screw

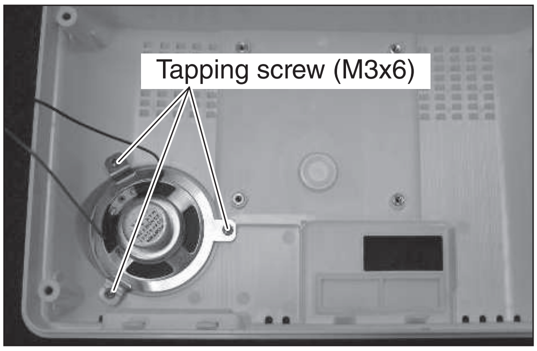
(2) Remove the screws fixing the panel and the arm.
Remove the four sems screws (M3 x 8) with a Phillips screwdriver.


Sems screw (M3x8)

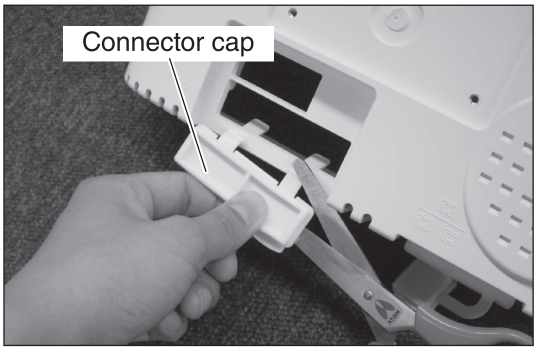
(3) Remove the rear panel.
Remove the four sems screws (M3 x 8) with a Phillips screwdriver.


Sems screw (M3x8)

(4) Remove the attachment fixing the speaker.
Remove the three tapping screws (M3 x 6) with a Phillips screwdriver.


Tapping screw (M3x6)

(5) Remove the connector cap from the rear panel.
Remove the connector cap from the rear panel by either pulling out the legs of the cap or cutting them.


Connector cap

(6) Reassembly: Reassemble in the reverse order of disassembly.

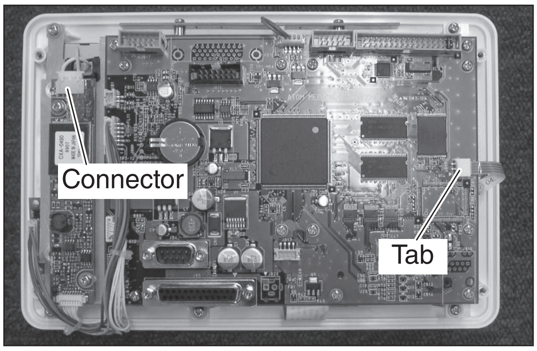
⚠CAUTION

- Take care not to get the cable caught. If you cut the legs of the connector cap when removing it, attach a new connector cap.

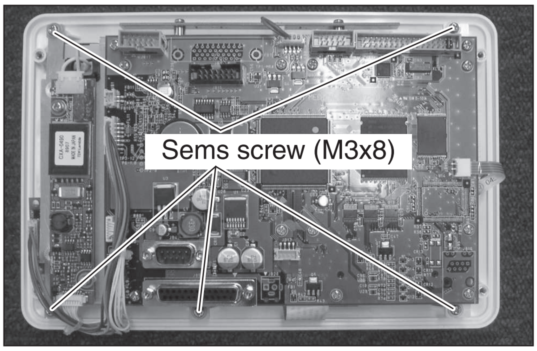
6-5-5. Replacing the LCD Display

(1) Remove the rear panel.
Follow (1) and (2) in "6-5-3. Replacing the Front Panel."

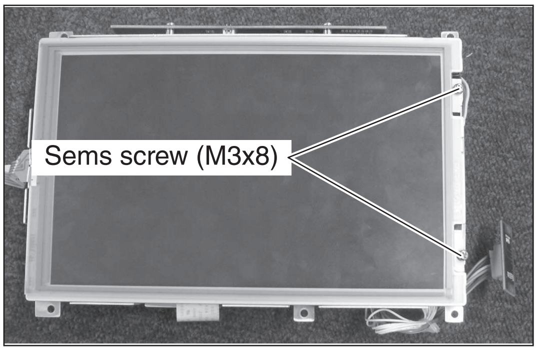
(2) Remove the connector connected to the LCD display.
Remove the connector of the CCFL inverter and the tab of the touch panel.



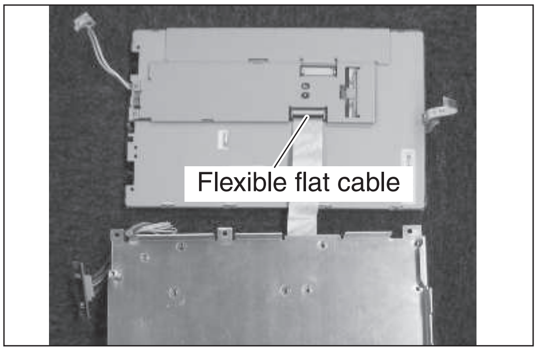
(3) Remove the LCD display, the LCD display board and the CCFL inverter together with the chassis.
Remove the five sems screws (M3 x 8) with a Phillips screwdriver.



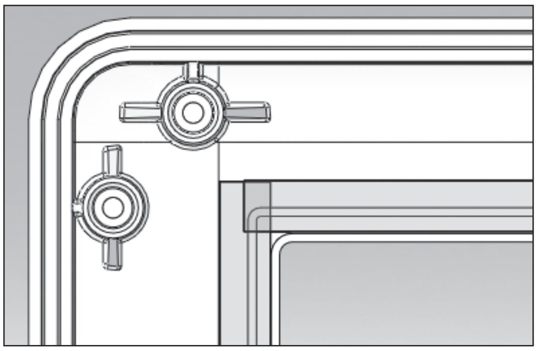
(4) Remove the LCD display from the chassis.
Remove the two sems screws (M3 x 8) with a Phillips screwdriver.



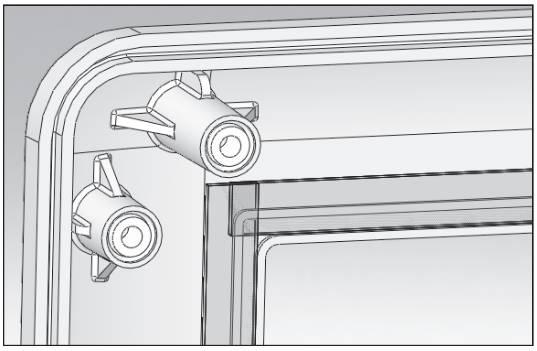
(5) Remove the cable attached to the back of the LCD display.
Remove the flexible flat cable from the LCD display.



(6) Reassembly: Reassemble in the reverse order of disassembly.
Be sure to replace the waterproof seals between the front panel and the LCD display with new seals.
Affix the waterproof seals along the inner edge of the front panel.



Overlap the seals at the corners, making sure that they do not protrude inwards.

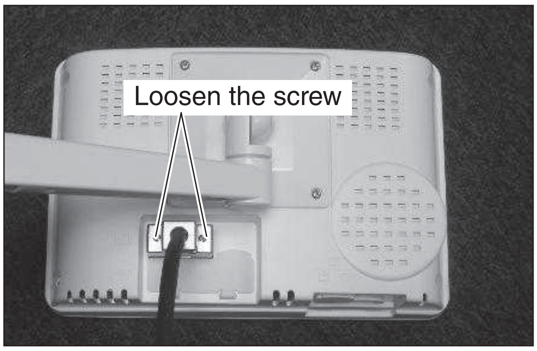


⚠CAUTION

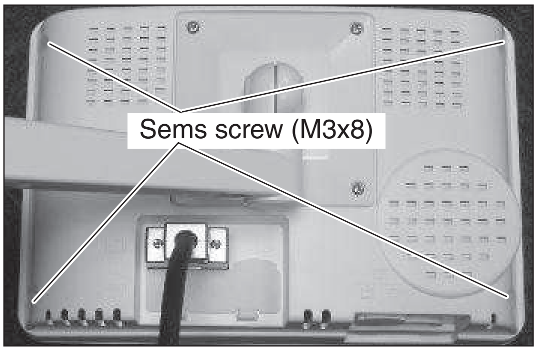
- Be sure to attach the flexible flat cable with the correct side up. Take care not to get the touch panel tab bent or caught.

6-5-6. Replacing the Speaker

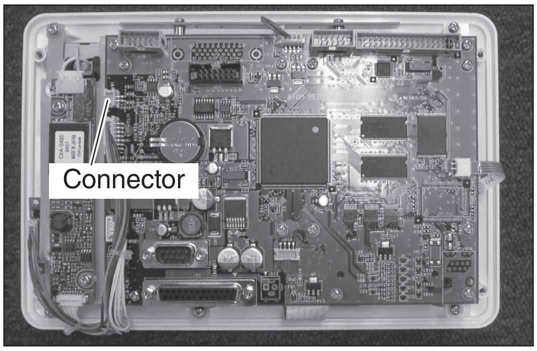
(1) Remove the cable.
Loosen the two screws fixing the cable with a small Phillips screwdriver and remove the cable.



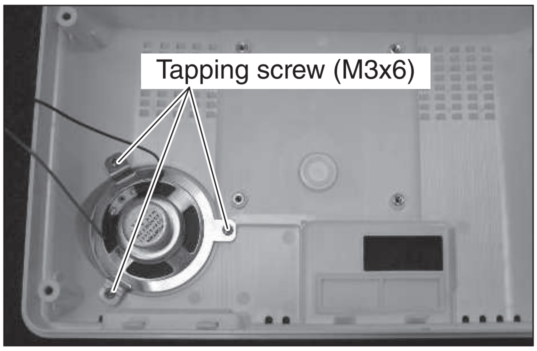
(2) Remove the rear panel.
Remove the four sems screws (M3 x 8) with a Phillips screwdriver.



(3) Remove the connector from the LCD display board.
Remove the connector JB1 from the LCD display board.



(4) Remove the attachment fixing the speaker.
Remove the three tapping screws (M3 x 6) with a Phillips screwdriver.



(5) Reassembly: Reassemble in the reverse order of disassembly.

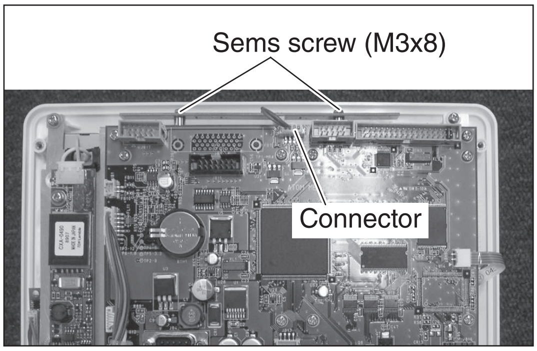
⚠CAUTION

- Take care not to get the cable caught.

6-5-7. Replacing the Alarm Lamp Board

(1) Remove the rear panel.
Follow (1) and (2) in "6-5-3. Replacing the Front Panel."

(2) Remove the alarm lamp board.
Remove the two sems screws (M3 x 8) with a Phillips screwdriver. Remove the connector from the alarm lamp board.



(3) Reassembly: Reassemble in the reverse order of disassembly.

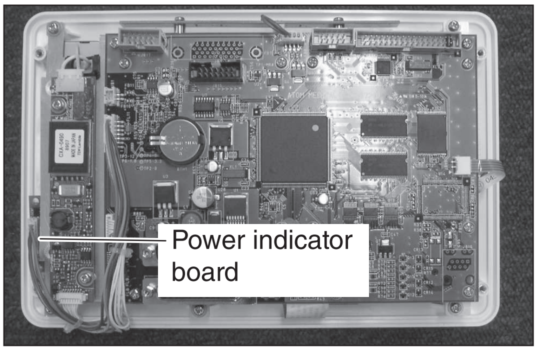
⚠CAUTION

- Take care not to get the cable caught.

6-5-8. Replacing the Power Indicator Board

(1) Remove the rear panel.
Follow (1) and (2) in “6-5-3. Replacing the Front Panel.”

(2) Remove the power indicator board.
Remove the connector from the power indicator board.



(3) Reassembly: Reassemble in the reverse order of disassembly.

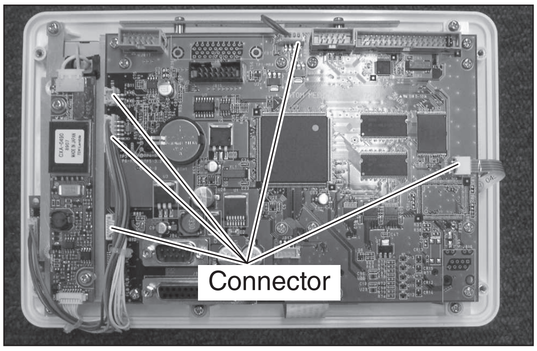
⚠CAUTION

- Take care not to get the cable caught.

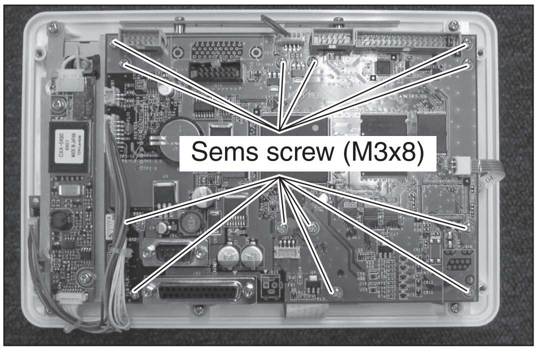
6-5-9. Replacing the LCD Display Board

(1) Remove the rear panel.
Follow (1) and (2) in “6-5-3. Replacing the Front Panel.”

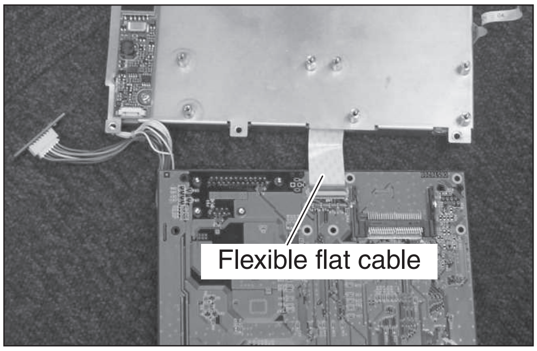
(2) Remove the connectors from the LCD display board.
Remove the connectors JB1, JB2, JB9, JB11 and JB19 from the LCD display board.



(3) Remove the LCD display board.
Remove the 13 sems screws (M3 x 8) with a Phillips screwdriver.



(4) Remove the cable from the LCD display board.
Remove the flexible flat cable attached to the back of the LCD display board.



(5) Reassembly: Reassemble in the reverse order of disassembly.

(6) After reassembling, perform various setting procedures on the display.

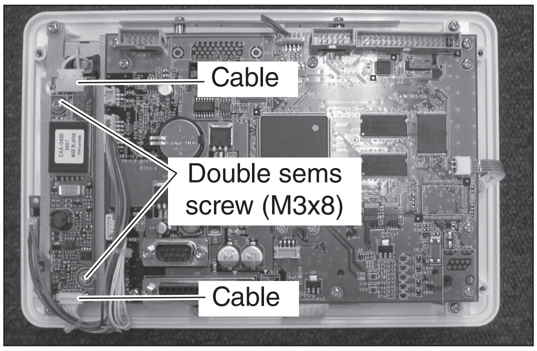
⚠CAUTION

● Take care not to get the cable caught.

6-5-10. Replacing the CCFL Inverter

(1) Remove the rear panel.
Follow (1) and (2) in "6-5-3. Replacing the Front Panel."

(2) Remove the CCFL inverter.
Remove the two cables (upper and lower). Remove the two double sems screws (M3 x 8) with a Phillips screwdriver.



(3) Reassembly: Reassemble in the reverse order of disassembly.

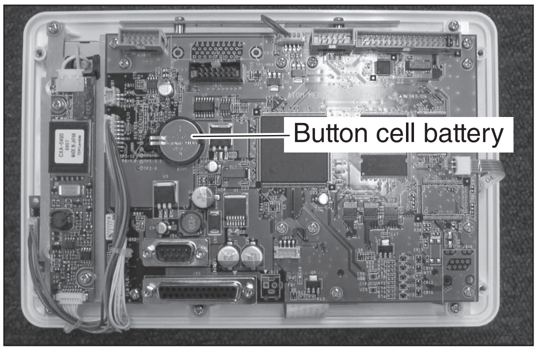
⚠CAUTION

● Take care not to get the cable caught.

6-5-11. Replacing the Button Cell Battery for the Display

(1) Remove the rear panel.
Follow (1) and (2) in “6-5-3. Replacing the Front Panel.”

(2) Remove the button cell battery.


Button cell battery

(3) Reassembly: Reassemble in the reverse order of disassembly.

(4) After reassembling, set the time and the date again on the display.

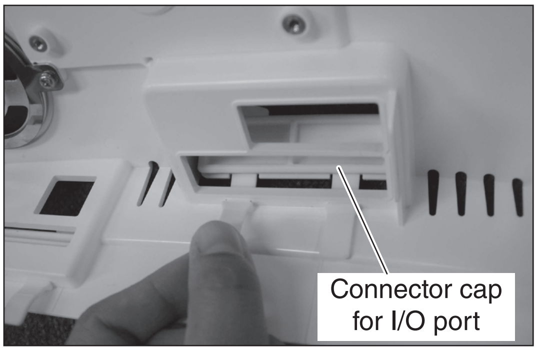
⚠CAUTION

- Take care not to get the cable caught.

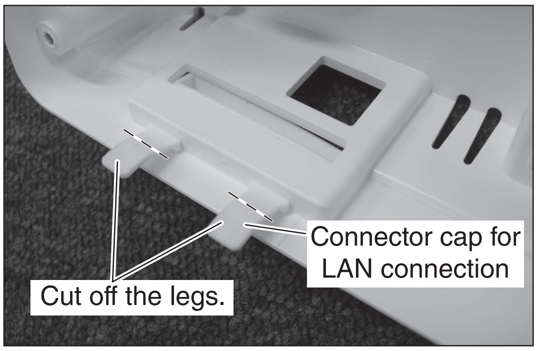
6-5-12. Replacing the Connector Cap

(1) Remove the rear panel.
Follow (1) and (2) in “6-5-3. Replacing the Front Panel.”

(2) Remove the connector cap.


Connector cap
for I/O port

(3) Attach the connector cap.
Insert the legs of the connector cap through the slots in the rear panel and pull them from inside the rear panel. As for the connector cap for the LAN connection, after inserting the legs, cut them off along the lines shown in the picture on the right.


Connector cap for
LAN connection
Cut off the legs.

(4) Reassembly: Reassemble in the reverse order of disassembly.

⚠CAUTION

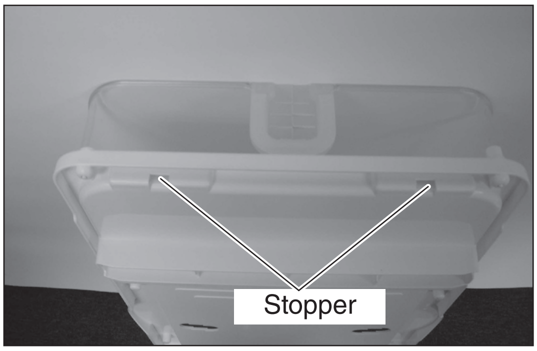
- Take care not to get the cable caught.

6-6. Mattress Platform

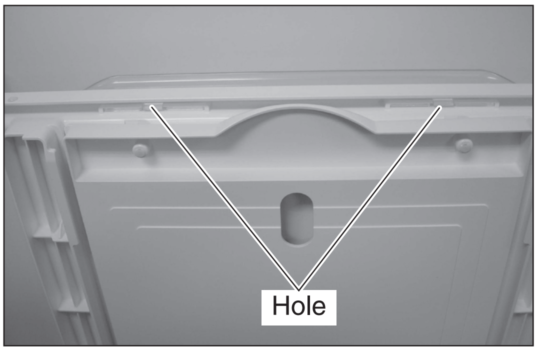
6-6-1. Replacing the Baby Guard (Front/Rear)/Baby Guard (side)

<Serial Number 2120357 or earlier>

(1) Release the two stoppers fixing the baby guard and remove the baby guard.
Push the center of the stopper head on one side, pull up the baby guard and release the stopper. Push the center of the stopper head on the other side, pull up the baby guard, release the stopper, and then remove the baby guard.



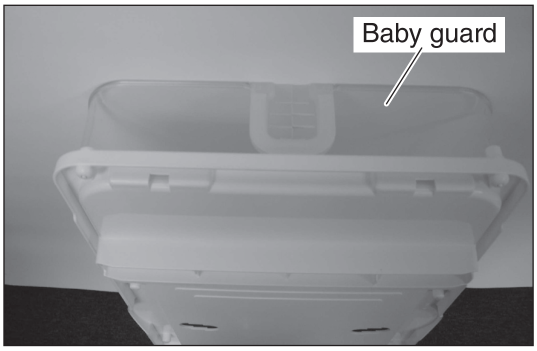
(2) Attach the baby guard by inserting the stoppers into the two holes in the mattress platform. Push the stoppers firmly into place in such a way that no gap is observed between the mattress platform and the baby guard. After insertion, pull up the baby guard and make sure that it does not come off. As for the baby guard (side), be careful not to attach it inside out.



<Serial Number 2120358 or later>

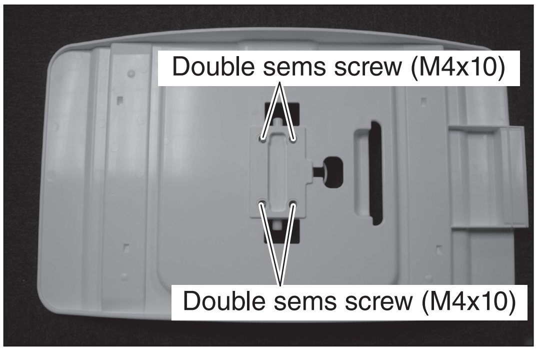
(1) Pull the baby guard upward while holding the mattress platform.

(2) Attach the baby guard by inserting the stoppers into the two holes in the mattress platform.
Push the stoppers firmly into place in such a way that no gap is observed between the mattress platform and the baby guard.

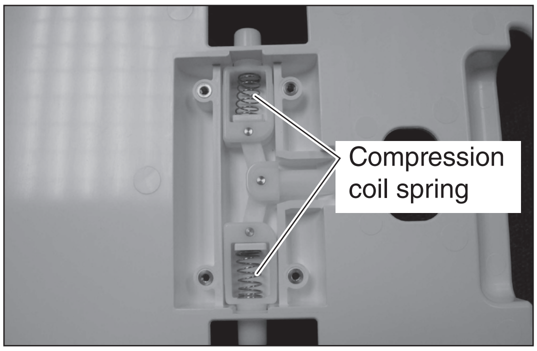


6-6-2. Replacing the Latch

(1) Remove the lid of the mattress platform tray.
Remove the four protective stickers and then remove the four double sems screws (M4 x 10) with a Phillips screwdriver.


Double sems screw (M4x10)
Double sems screw (M4x10)

(2) Remove the latch.
Remove the two compression coil springs inside the latch and then remove the latch.

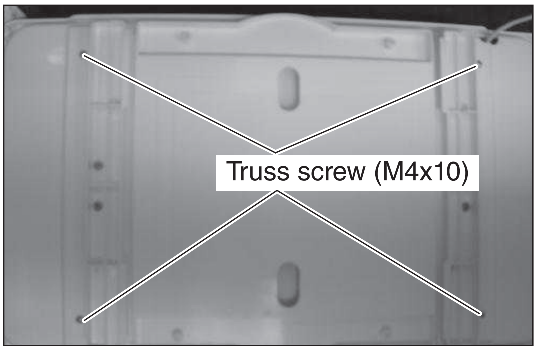

Compression coil spring

(3) Reassembly: Reassemble in the reverse order of disassembly.

6-6-3. Replacing the Weight Monitor Module

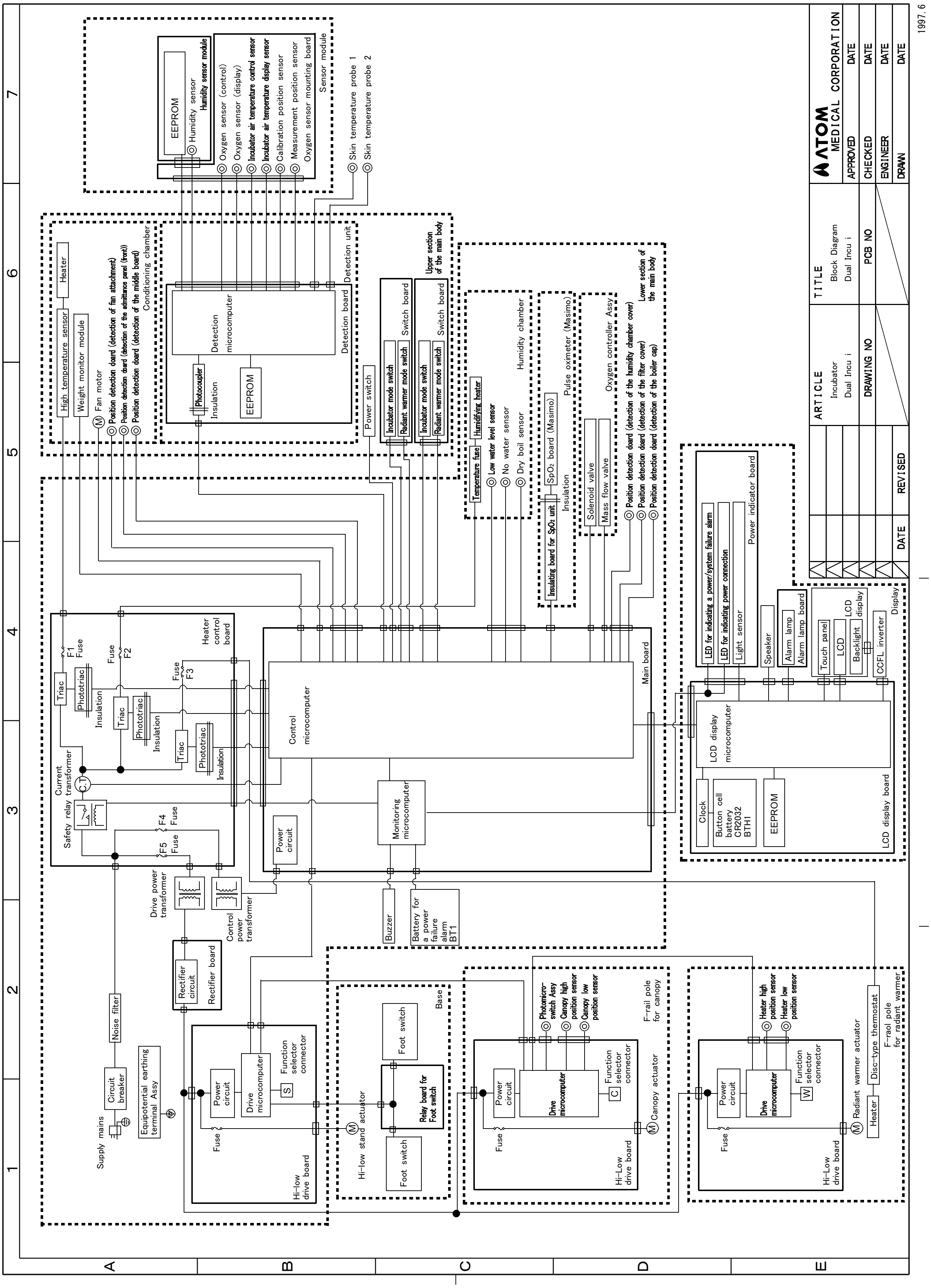
(1) Remove the weight monitor module from the tray for weight monitor.

Remove the four truss screws (M4 x 10) with a Phillips screwdriver.


Truss screw (M4x10)

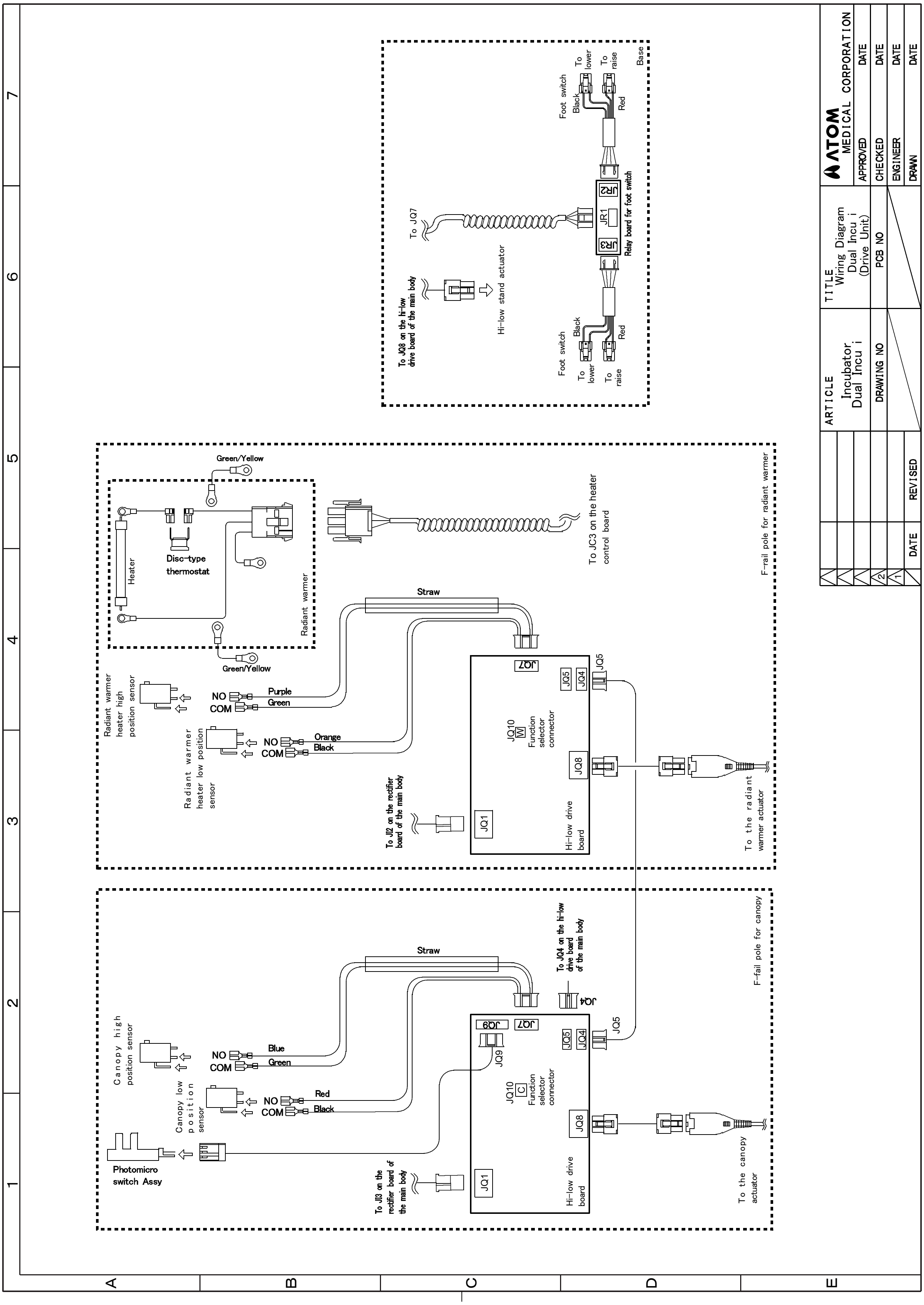
(2) Reassembly: Reassemble in the reverse order of disassembly.

[7] Electrical Block Diagram


1
2
3
4
5
6
7
A
B
C
D
E
EEPROM
Humidity sensor
Humidity sensor module
Oxygen sensor (control)
Oxygen sensor (display)
Incubator air temperature control sensor
Incubator air temperature display sensor
Calibration position sensor
Measurement position sensor
Oxygen sensor mounting board
Sensor module
Skin temperature probe 1
Skin temperature probe 2
Heater
High temperature sensor
Weight monitor module
Fan motor
Position detection board (detection of fan attachment)
Position detection board (detection of the admittance panel (front))
Position detection board (detection of the middle board)
Conditioning chamber
Detection microcomputer
Photocoupler
Insulation
EEPROM
Detection board
Detection unit
Power switch
Incubator mode switch
Radiant warmer mode switch
Switch board
Incubator mode switch
Radiant warmer mode switch
Switch board
Upper section of the main body
Temperature fuse
Humidifying heater
Low water level sensor
No water sensor
Dry boil sensor
Humidity chamber
SpO2 board (Masimo)
Insulating board for SpO2 unit
Insulation
Pulse oximeter (Masimo)
Solenoid valve
Mass flow valve
Oxygen controller Assy
Position detection board (detection of the humidity chamber cover)
Position detection board (detection of the filter cover)
Position detection board (detection of the boiler cap)
Lower section of the main body
LED for indicating a power/system failure alarm
LED for indicating power connection
Light sensor
Power indicator board
Speaker
Alarm lamp
Alarm lamp board
Touch panel
LCD
Backlight
LCD display
CCFL inverter
Display
LCD display microcomputer
Clock
Button cell battery CR2032 BTH1
EEPROM
LCD display board
F1 Fuse
Fuse F2
Fuse F3
Triac
Phototriac
Insulation
Triac
Phototriac
Insulation
Triac
Phototriac
Insulation
Heater control board
Current transformer
C.T
Safety relay
F4 Fuse
F5 Fuse
Control microcomputer
Main board
Monitoring microcomputer
Power circuit
Buzzer
Battery for a power failure alarm BT1
Drive power transformer
Control power transformer
Rectifier circuit
Rectifier board
Noise filter
Circuit breaker
Supply mains
Equipotential earthing terminal Assy
Power circuit
Drive microcomputer
Function selector connector
S
Fuse
Hi-low drive board
Foot switch
Relay board for Foot switch
Foot switch
Hi-low stand actuator
Base
Photomicro-switch Assy
Canopy high position sensor
Canopy low position sensor
F-rail pole for canopy
Power circuit
Drive microcomputer
Function selector connector
C
Fuse
Hi-Low drive board
Canopy actuator
Heater high position sensor
Heater low position sensor
Power circuit
Drive microcomputer
Function selector connector
W
Fuse
Hi-Low drive board
Radiant warmer actuator
Heater
Disc-type thermostat
F-rail pole for radiant warmer
ATOM MEDICAL CORPORATION
TITLE
Block Diagram
Dual Incu i
ARTICLE
Incubator
Dual Incu i
DRAWING NO
PCB NO
APPROVED
CHECKED
ENGINEER
DRAWN
DATE
DATE
DATE
DATE
DATE
REVISED
1997. 6

[8] Wiring Diagram

8-1. Drive Unit


To JQ8 on the hi-low drive board of the main body
Hi-low stand actuator
To JQ7
Foot switch
Black
Red
To lower
To raise
JR1
JR2
JR3
Relay board for foot switch
Base
Green/Yellow
Heater
Disc-type thermostat
Radiant warmer
To JC3 on the heater control board
F-rail pole for radiant warmer
Straw
Radiant warmer heater high position sensor
Radiant warmer heater low position sensor
NO
COM
Purple
Green
Orange
Black
JQ7
JQ5
JQ4
JQ10
W
Function selector connector
JQ8
JQ1
Hi-low drive board
To JJ2 on the rectifier board of the main body
To the radiant warmer actuator
Canopy high position sensor
Canopy low position sensor
Photomicro switch Assy
Blue
Red
JQ9
C
To JQ4 on the hi-low drive board of the main body
To JJ3 on the rectifier board of the main body
To the canopy actuator
F-fail pole for canopy
ARTICLE
Incubator Dual Incu i
TITLE
Wiring Diagram Dual Incu i (Drive Unit)
ATOM MEDICAL CORPORATION
DRAWING NO
PCB NO
APPROVED
CHECKED
ENGINEER
DRAWN
DATE
REVISED
1997. 6
1
2
3
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A
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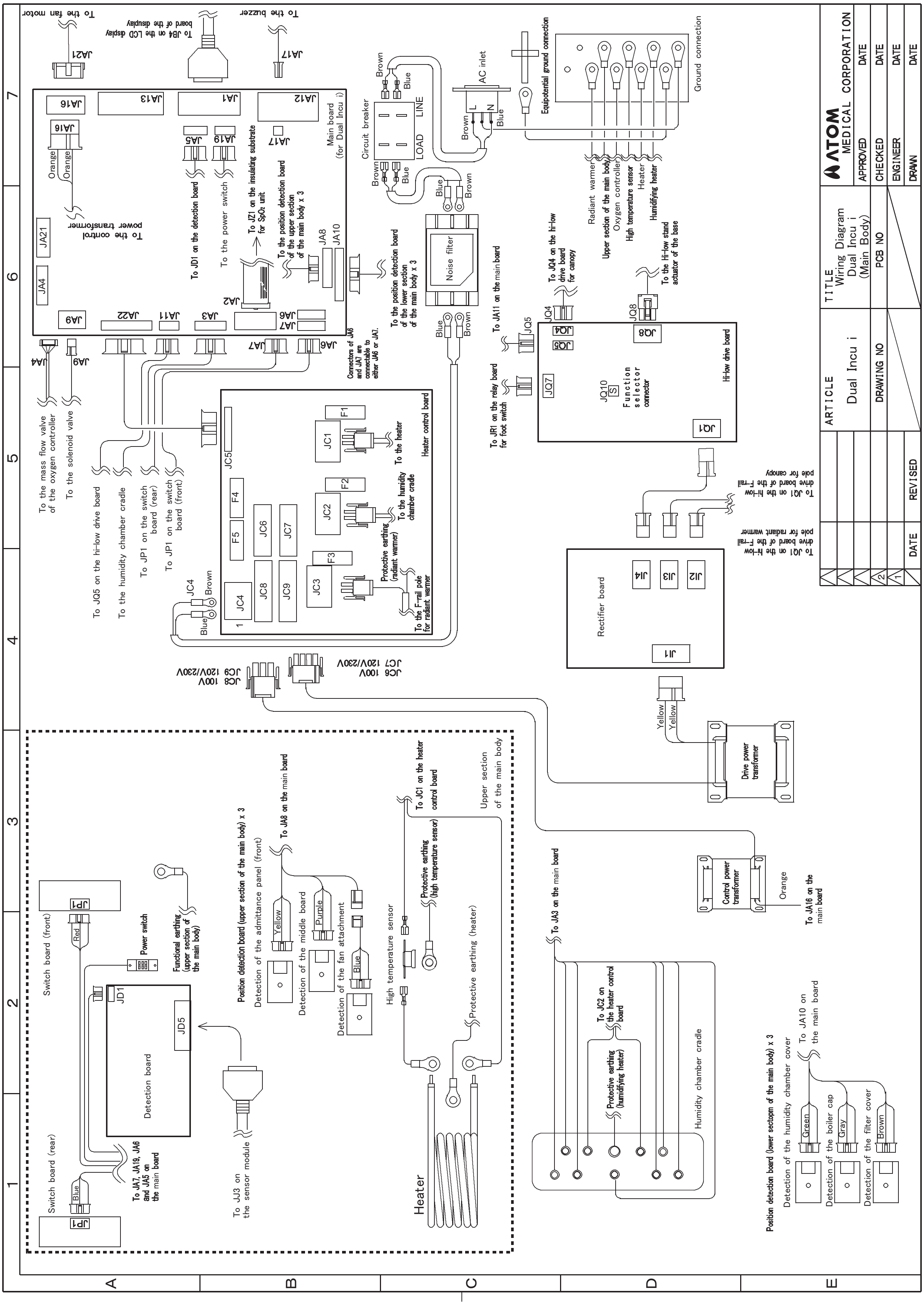
C
D
E

8-2. Main Body


Main board (for Dual Incu i)
JA1
JA2
JA3
JA4
JA5
JA6
JA7
JA8
JA9
JA10
JA11
JA12
JA13
JA16
JA17
JA19
JA21
JA22
To the fan motor
To JB4 on the LCD display board of the display
To the buzzer
To the control power transformer
To JD1 on the detection board
To the power switch
To JZ1 on the insulating substrate for SpO2 unit
To the position detection board of the upper section of the main body x 3
To the position detection board of the lower section of the main body x 3
Connectors of JA6 and JA7 are connectable to either JA6 or JA7.
To the mass flow valve of the oxygen controller
To the solenoid valve
To JQ5 on the hi-low drive board
To the humidity chamber cradle
To JP1 on the switch board (rear)
To JP1 on the switch board (front)
Orange
Circuit breaker
LOAD
LINE
Brown
Blue
AC inlet
L
N
Equipotential ground connection
Ground connection
Noise filter
Radiant warmer
Upper section of the main body
Oxygen controller
High temperature sensor
Heater
Humidifying heater
To JQ4 on the hi-low drive board for canopy
To the hi-low stand actuator of the base
To JA11 on the main board
To JR1 on the relay board for foot switch
JQ1
JQ4
JQ5
JQ7
JQ8
JQ10
S
Function selector connector
Hi-low drive board
To JQ1 on the hi-low drive board of the F-rail pole for canopy
To JQ1 on the hi-low drive board of the F-rail pole for radiant warmer
Heater control board
JC1
JC2
JC3
JC4
JC5
JC6
JC7
JC8
JC9
F1
F2
F3
F4
F5
To the heater
To the humidity chamber cradle
Protective earthing (radiant warmer)
To the F-rail pole for radiant warmer
JC6 100V
JC7 120V/230V
JC8 100V
JC9 120V/230V
Rectifier board
JI1
JI2
JI3
JI4
Yellow
Drive power transformer
Control power transformer
To JA16 on the main board
Switch board (front)
Switch board (rear)
JP1
Red
Power switch
Functional earthing (upper section of the main body)
Detection board
JD1
JD5
To JA7, JA19, JA6 and JA5 on the main board
To JJ3 on the sensor module
Position detection board (upper section of the main body) x 3
Detection of the admittance panel (front)
Detection of the middle board
Detection of the fan attachment
Purple
To JA8 on the main board
High temperature sensor
Protective earthing (high temperature sensor)
Protective earthing (heater)
To JC1 on the heater control board
Upper section of the main body
Heater
To JA3 on the main board
To JC2 on the heater control board
Protective earthing (humidifying heater)
Humidity chamber cradle
Position detection board (lower section of the main body) x 3
Detection of the humidity chamber cover
Detection of the boiler cap
Detection of the filter cover
Green
Gray
To JA10 on the main board
A
B
C
D
E
1
2
3
4
5
6
7
ATOM MEDICAL CORPORATION
APPROVED
CHECKED
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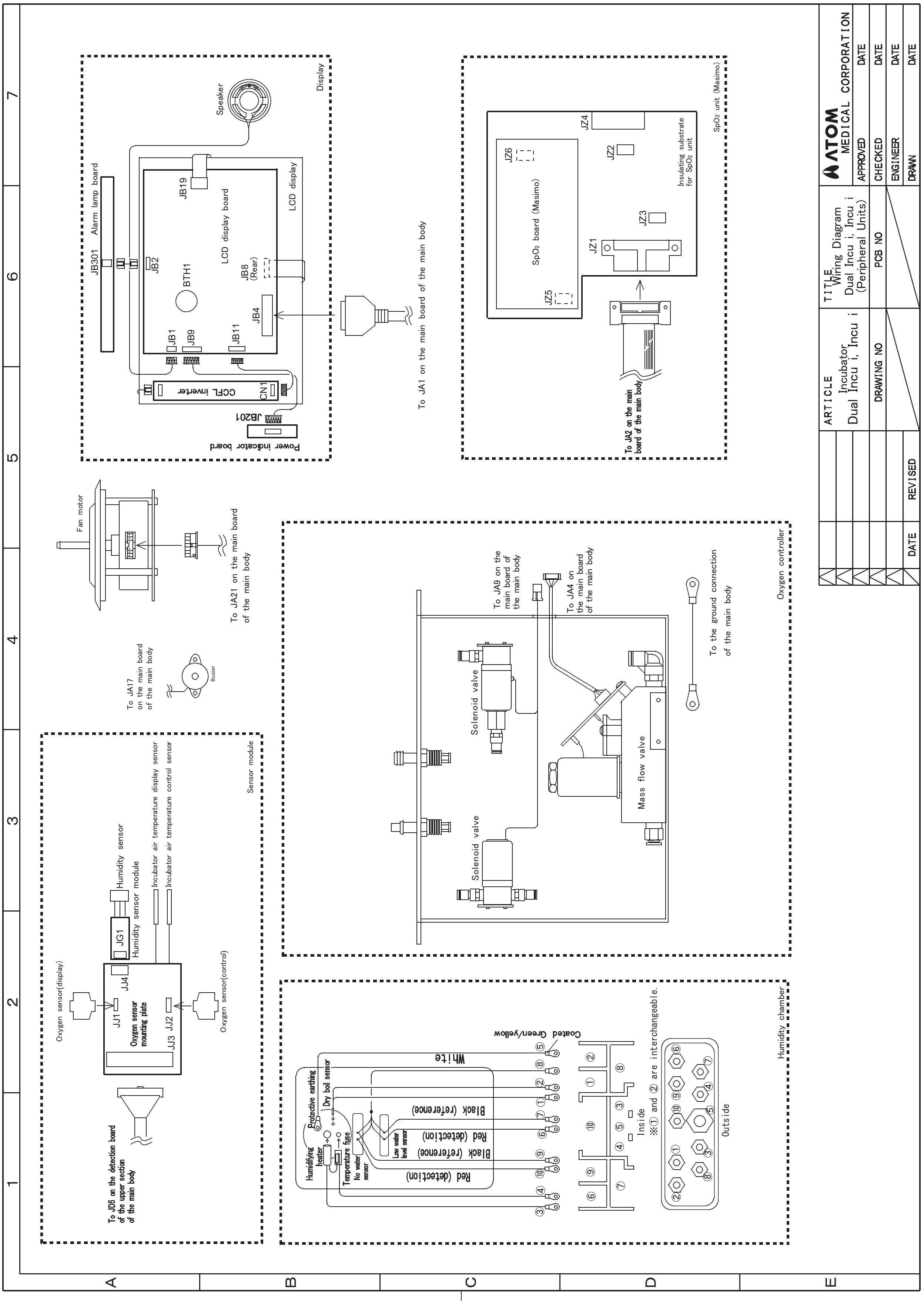
DATE
TITLE
Wiring Diagram Dual Incu i (Main Body)
PCB NO
ARTICLE
Dual Incu i
DRAWING NO
REVISED
1997. 6

8-3. Peripheral Units


Display
Speaker
Alarm lamp board
JB301
JB2
JB19
LCD display board
LCD display
BTH1
JB8 (Rear)
JB4
JB1
JB9
JB11
CN1
CCFL inverter
JB201
Power indicator board
To JA1 on the main board of the main body
SpO2 unit (Masimo)
JZ4
JZ6
JZ2
Insulating substrate for SpO2 unit
SpO2 board (Masimo)
JZ3
JZ1
JZ5
To JA2 on the main board of the main body
Fan motor
To JA21 on the main board of the main body
To JA17 on the main board of the main body
Buzzer
Oxygen controller
To JA9 on the main board of the main body
To JA4 on the main board of the main body
To the ground connection of the main body
Solenoid valve
Solenoid valve
Mass flow valve
Sensor module
Humidity sensor
Humidity sensor module
Incubator air temperature display sensor
Incubator air temperature control sensor
JG1
JJ4
JJ1
JJ2
JJ3
Oxygen sensor mounting plate
Oxygen sensor(display)
Oxygen sensor(control)
To JD5 on the detection board of the upper section of the main body
Humidity chamber
Coated Green/yellow
White
Black (reference)
Red (detection)
Black (reference)
Red (detection)
Protective earthing
Dry boil sensor
Humidifying heater
Temperature fuse
No water sensor
Low water level sensor
Inside
※① and ② are interchangeable.
Outside
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩
ATOM MEDICAL CORPORATION
APPROVED
CHECKED
ENGINEER
DRAWN
DATE
TITLE
Wiring Diagram
Dual Incu i, Incu i
(Peripheral Units)
PCB NO
ARTICLE
Incubator
Dual Incu i, Incu i
DRAWING NO
REVISED
DATE
1997. 6
1 2 3 4 5 6 7
A B C D E

[9] Parts List

✻ The description in this section relates to a unit which is equipped with a weight monitor. Please skip any reference unrelated to your unit.

9-1. Fig-1 Main Body and Accessories

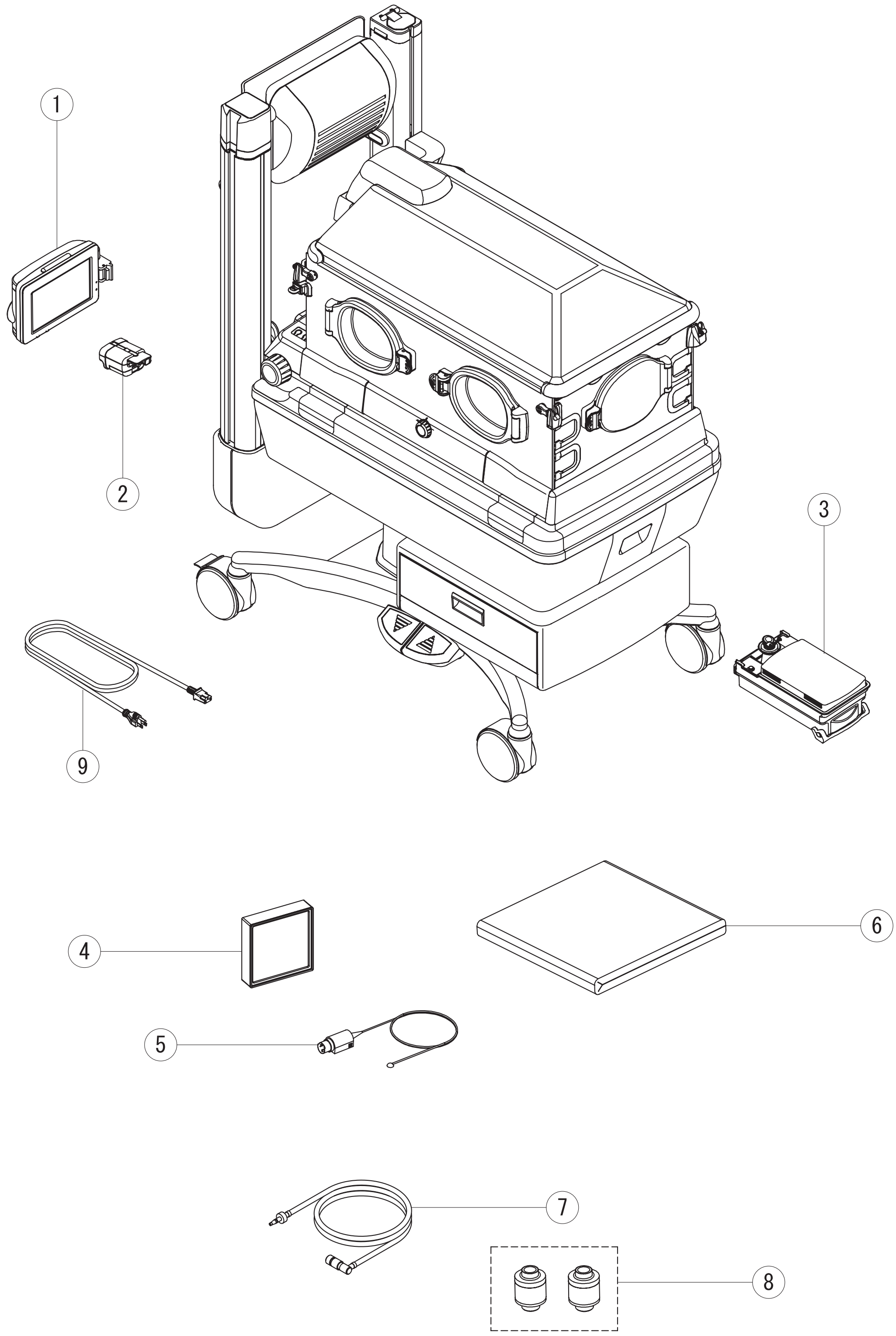


Fig-1

Fig-No.	Part Name	Part No.
1-1	Display (with F-rail arm)	98521
1-2	Sensor Module	98522
	Sensor Module for oxygen controller type	98523
1-3	Humidity chamber (with cartridge tank, boiler cap) (AC120V)	98525
	Humidity chamber (with cartridge tank, boiler cap) (AC230V)	98526
1-4	Pneumoclean (electrostatic air filter)	60269
1-5	Skin temp probe, 5mm O.D. (Y)	60889
1-6	Dust cover	98528
1-7	Piping connecting hose for oxygen (with KHI Jack) 3m	93163
	Piping connecting hose for oxygen (with Amco Jack) 3m	93165
	Piping connecting hose for oxygen (Diss coupler with jack) 3m	98531
1-8	Oxygen sensor	60859
1-9	Power cord (AC100-120V)	98532
	Power cord (AC120V) UL	99018
	Power cord (AC230V)	99017

9-2. Fig-2 Display

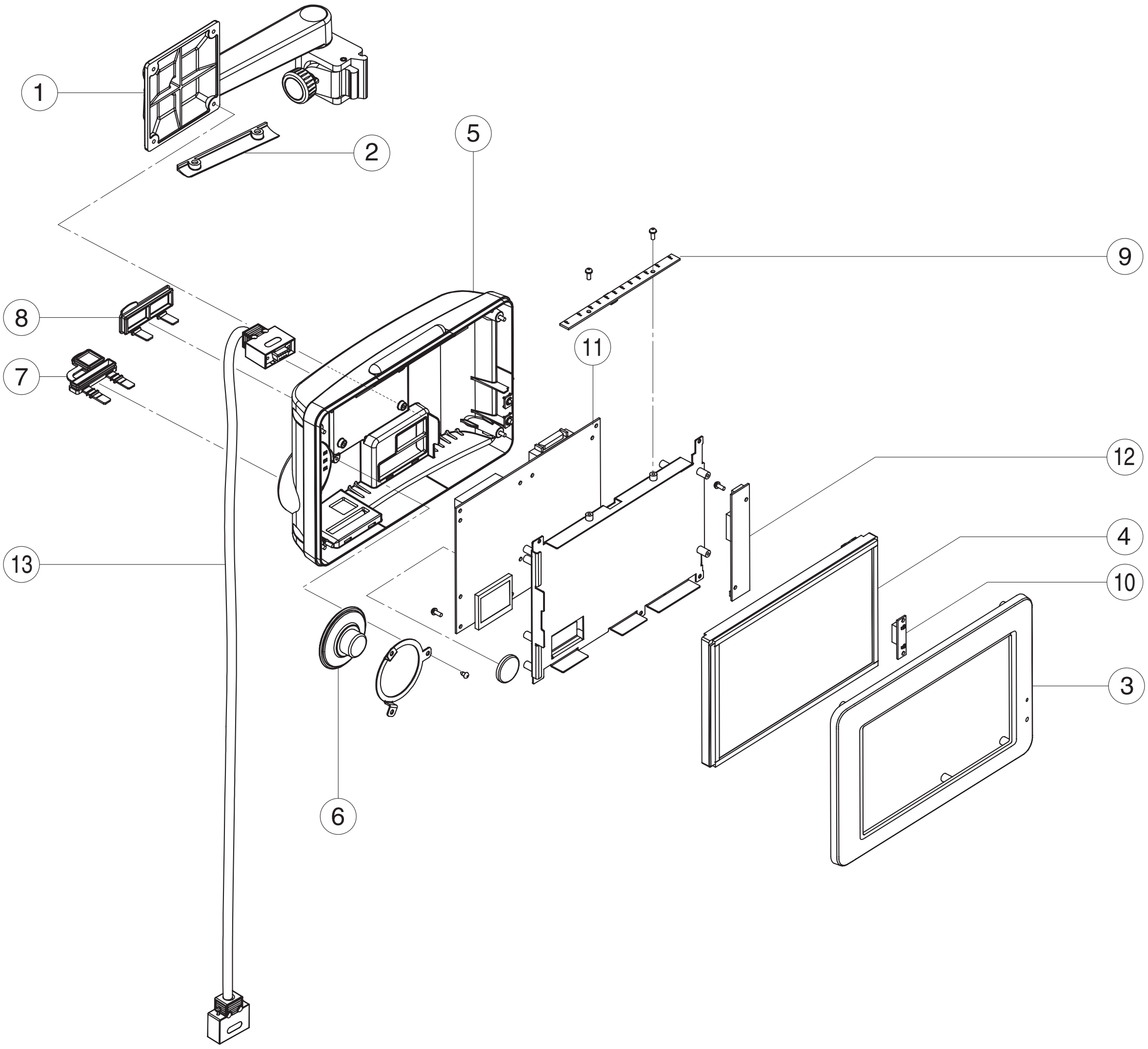

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Fig-2

Fig-No.	Part Name	Part No.
2-1	F-rail arm	98533
2-2	Cable guide (with fixing screws)	98534
2-3	Front panel	98535
2-4	LCD display	98536
2-5	Rear panel (with alarm lamp)	98537
2-6	Speaker (with cable)	98539
2-7	Connector cap (for LAN connection)	98540
2-8	Connector cap (for I/O port)	98541
2-9	Alarm lamp board	98542
2-10	Power indicator board	98543
2-11	LCD display board	98544
2-12	CCFL inverter	98545
2-13	Display cable	98546

9-3. Fig-3 Humidity Chamber

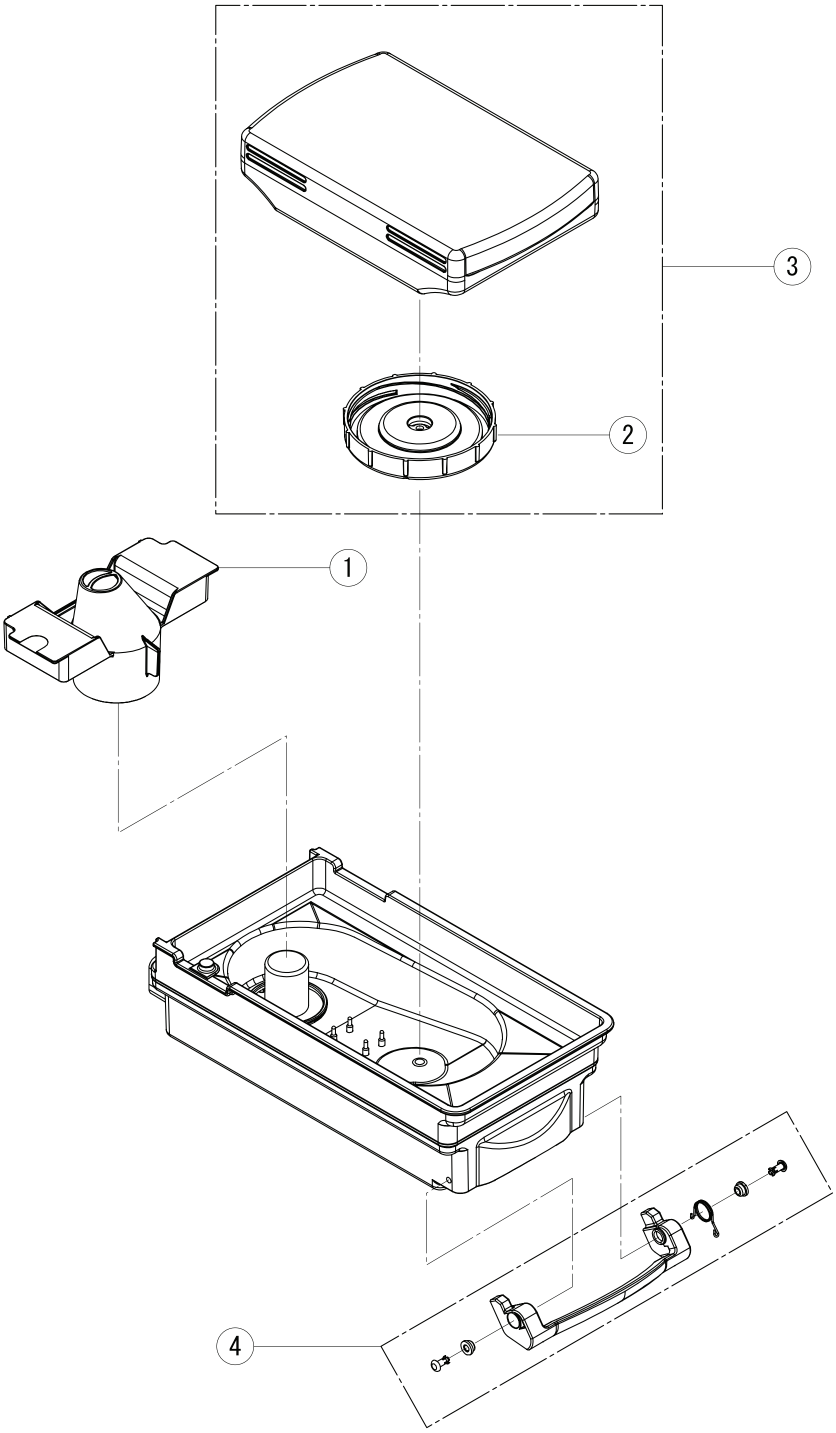

Fig-3

Fig-No.	Part Name	Part No.
3-1	Boiler cap	98547
3-2	Tank cap	98548
3-3	Cartridge tank (with cap)	98549
3-4	Humidity chamber handle	98553

9-4. Fig-4 Mattress Platform

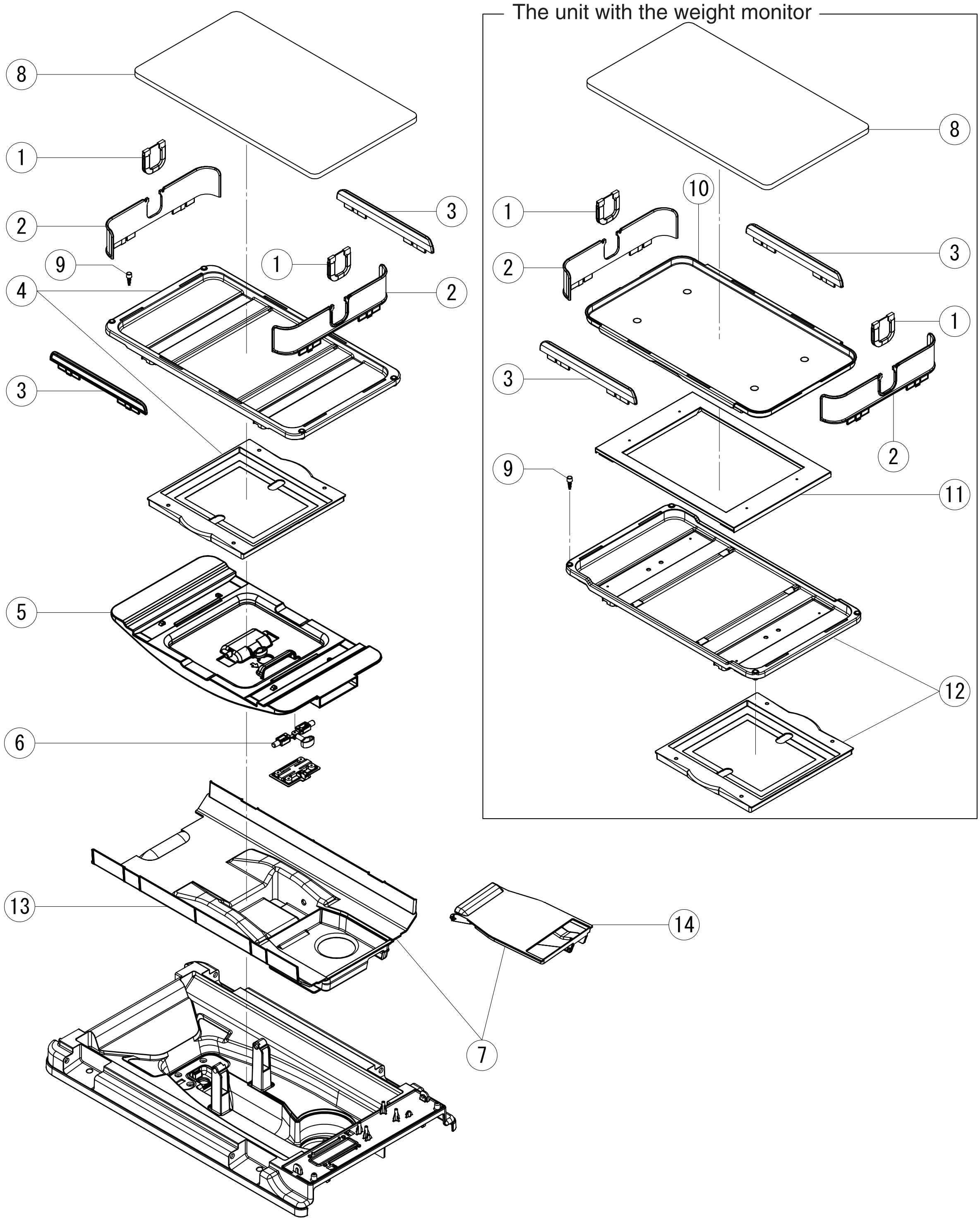
The unit with the weight monitor
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Fig-4

Fig-No.	Part Name	Part No.
4-1	Tube introduction slit packing	92326
4-2	Baby guard (front/rear)	98554
4-3	Baby guard (side)	98555
4-4	Mattress platform (with X-ray cassette tray)	98556
4-5	Mattress platform tray (with latch)	98557
4-6	Latch	98558
4-7	Middle board (with fan cover)	98559
4-8	Pressure dispersion mattress	60879
4-9	Level gauge	98561
4-10	Mattress platform for weight monitor	98562
4-11	Weight monitor module	98563
4-12	Tray for weight monitor (with X-ray cassette tray)	98564
4-13	Middle board	98565
4-14	Fan cover	98566

9-5. Fig-5 Upper Section of the Main Body 1

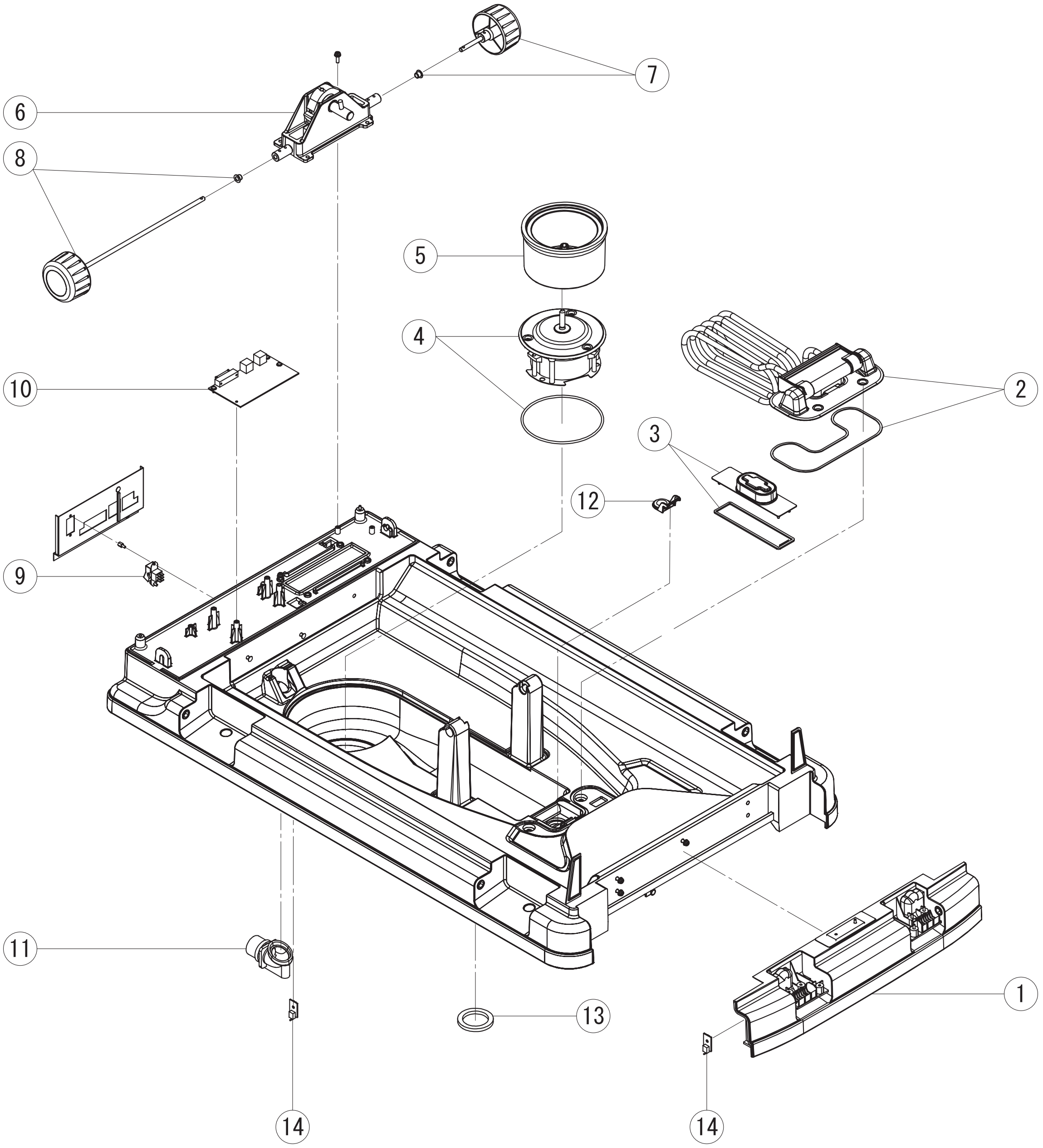
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Fig-5

Fig-No.	Part Name	Part No.
5-1	Hood cover (front)	98567
5-2	Heater for main unit (AC120V)	98569
	Heater for main unit (AC230V)	98570
5-3	High temperature sensor	98571
5-4	Fan motor	98572
5-5	Fan	98573
5-6	Tilting unit	98574
5-7	Tilting knob (right)	98575
5-8	Tilting knob (left)	98576
5-9	Power switch	98577
5-10	Detection board for temperature, skin temperature, humidity	98578
5-11	Filter joint	98579
5-12	Steam cap	98580
5-13	Humidity chamber cover packing	98581
5-14	Position detection board	98582

9-6. Fig-6 Upper Section of the Main Body 2

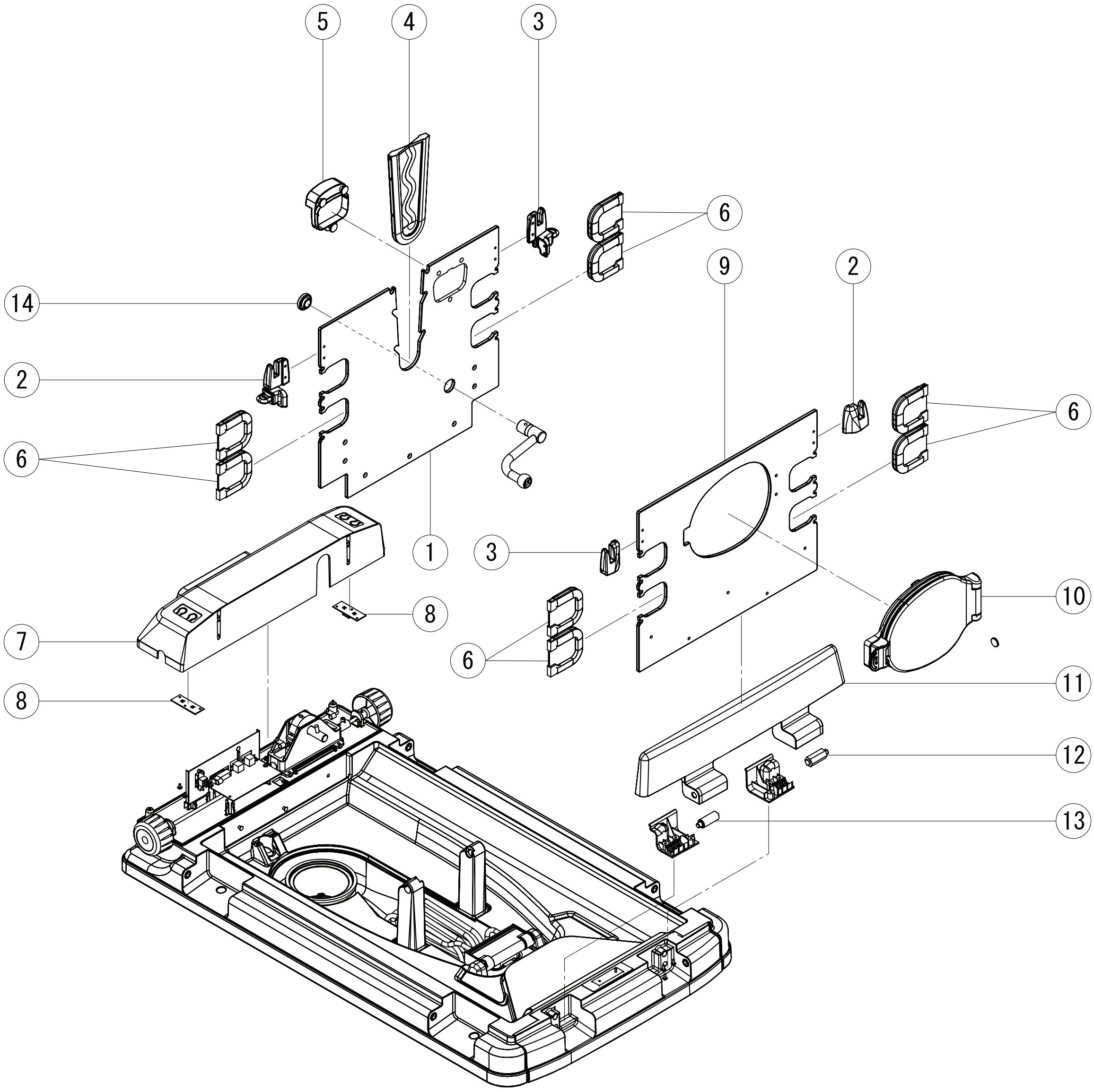
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Fig-6

Fig-No.	Part Name	Part No.
6-1	Admittance panel (rear)	98583
6-2	Admittance panel lock holder (left)	98712
6-3	Admittance panel lock holder (right)	98713
6-4	Patient circuit slot grommet	98586
6-5	Sensor module holder	98587
6-6	Tube introduction slit packing	92326
6-7	Control box cover	98588
6-8	Switch board	98589
6-9	Admittance panel (front)	98590
6-10	Snap-open access port (S-wall)	60898
6-11	Admittance panel hinge (front)	98592
6-12	Rotary damper (front)	98718
6-13	Admittance panel rotary shaft	98706
6-14	Tilting arm fixed ring for tilting arm	98595

9-7. Fig-7 Upper Section of the Main Body 3

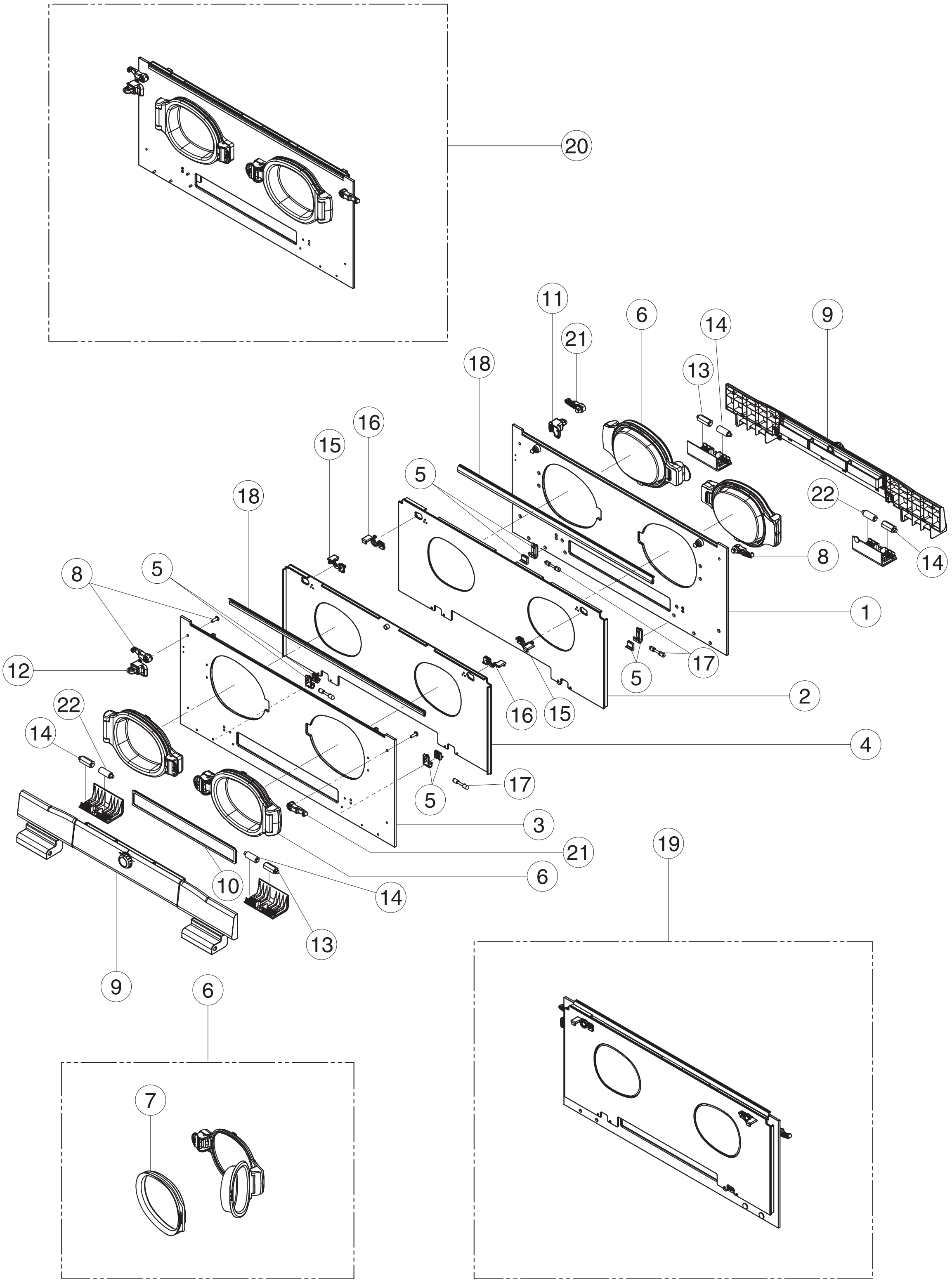
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Fig-7

Fig-No.	Part Name	Part No.
7-1	Admittance panel (right)	98596
7-2	Inner panel (right)	98597
7-3	Admittance panel (left)	98598
7-4	Inner panel (Left)	98675
7-5	Inner wall Bearing	98599
7-6	Snap-open access port (W-wall)	60897
7-7	Snap-open access port packing	98747
7-8	Admittance panel operating knob assy (left)	98719
7-9	Admittance panel hinge (side) (with X-ray cassette door)	98602
7-10	X-ray cassette tray door packing	98603
7-11	Admittance panel operating lever (right)	98681
7-12	Admittance panel operating lever (left)	98724
7-13	Rotary damper (right/side)	98593
7-14	Rotary damper (left/side)	98594
7-15	Inner wall lever (right)	92887
7-16	Inner wall lever (left)	92888
7-17	Inner wall shaft bearing	92892
7-18	Admittance panel packing	98606
7-19	Admittance panel assy (right) (with snap-open access port, inner panel, operating knob, packing)	98727
7-20	Admittance panel assy (left) (with snap-open access port, inner panel, operating knob, packing)	98728
7-21	Admittance panel operating knob assy (right)	98720
7-22	Admittance panel rotary shaft	98706

9-8. Fig-8 Lower Section of the Main Body

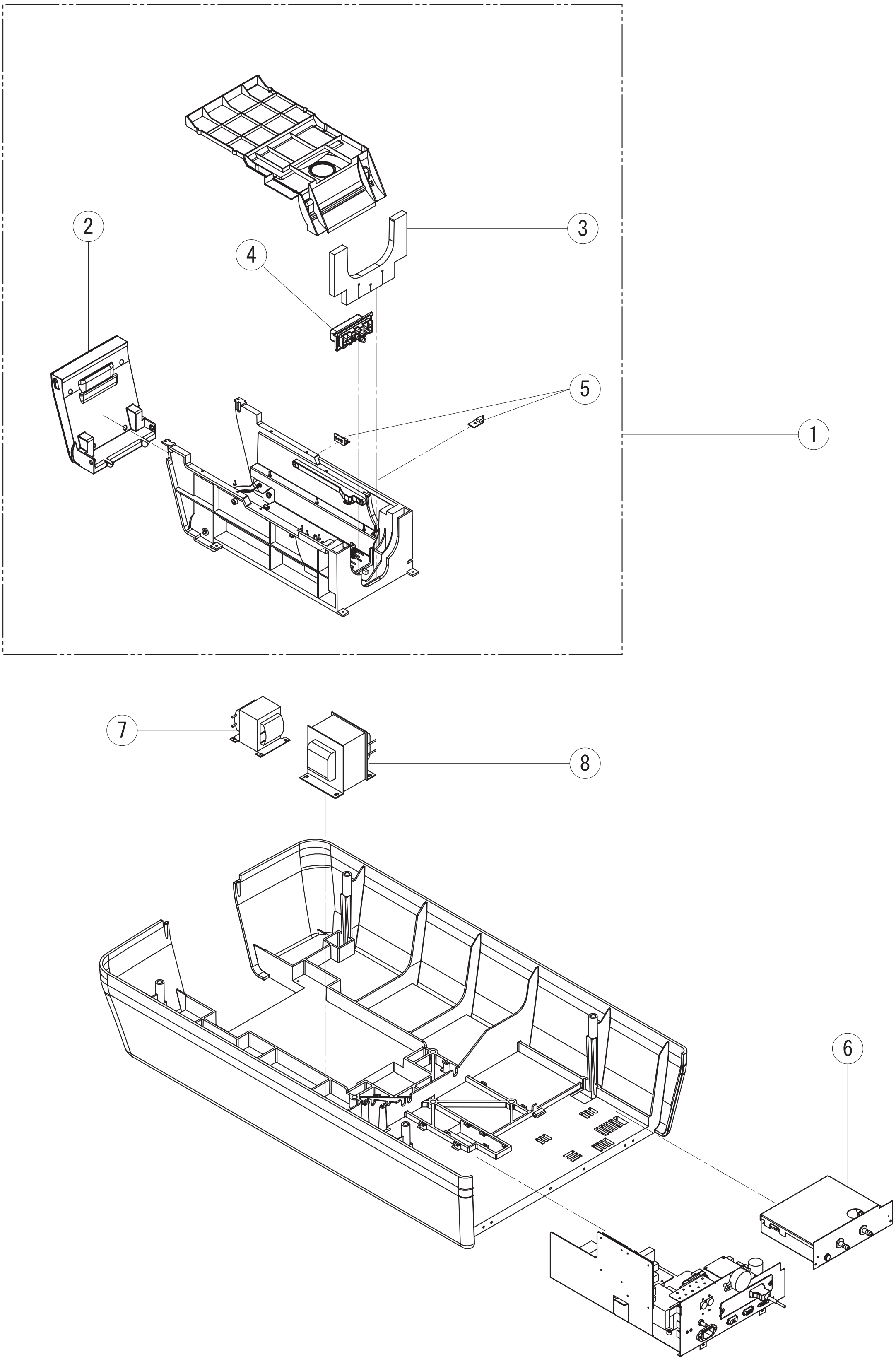

Fig-8

Fig-No.	Part Name	Part No.
8-1	Humidity chamber cradle	98610
8-2	Humidity chamber cover	98611
8-3	Humidity chamber cradle packing	98612
8-4	Humidity chamber connector	98613
8-5	Position detection board	98582
8-6	Oxygen controller	98615
8-7	Control power transformer (AC100~120V)	98616
	Control power transformer (AC230)	98617
8-8	Drive power transformer (AC100~120V)	98618
	Drive power transformer (AC230V)	98619

9-9. Fig-9 Power Unit

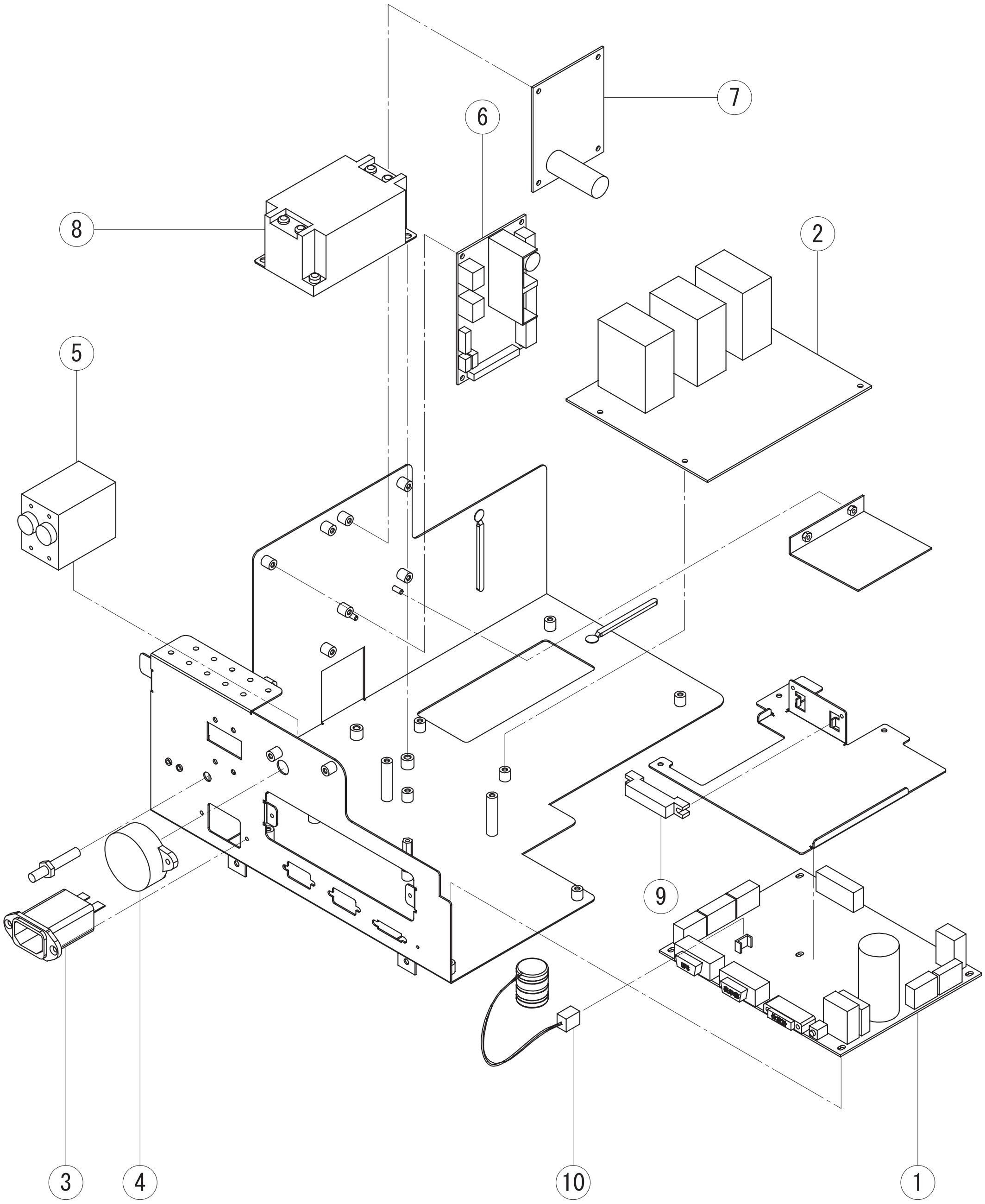
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Fig-9

Fig-No.	Part Name	Part No.
9-1	Main board	98620
9-2	Heater control board (with fuse) (AC120V)	98622
	Heater control board (with fuse) (AC230V)	98623
9-3	AC inlet	98624
9-4	Buzzer	98625
9-5	Circuit breaker (AC100~120V)	98629
	Circuit breaker (AC230V)	98630
9-6	Hi-Low drive board for Hi-Low stand	98627
9-7	Rectifier board	98628
9-8	Noise filter	98626
9-9	SpO_2 connection board	98631
9-10	Battery for power failure alarm	92791

Fuse for the heater control board

Fig-No.	Part Name	Part No.
F1	Fuse F4A (fast-blow)	98633
	Fuse F2A (fast-blow)	98634
F2	Fuse F1.25A (fast-blow)	98636
	Fuse F0.63A (fast-blow)	98637
F3	Fuse F6.3A (fast-blow)	98639
	Fuse F3.15A (fast-blow)	98640
F4	Fuse T0.63A (slow-blow)	98641
	Fuse T0.315A (slow-blow)	98643
F5	Fuse T3.15A (slow-blow)	95678
	Fuse T1.6A (slow-blow)	99150

9-10. Fig-10 Oxygen Controller Assembly

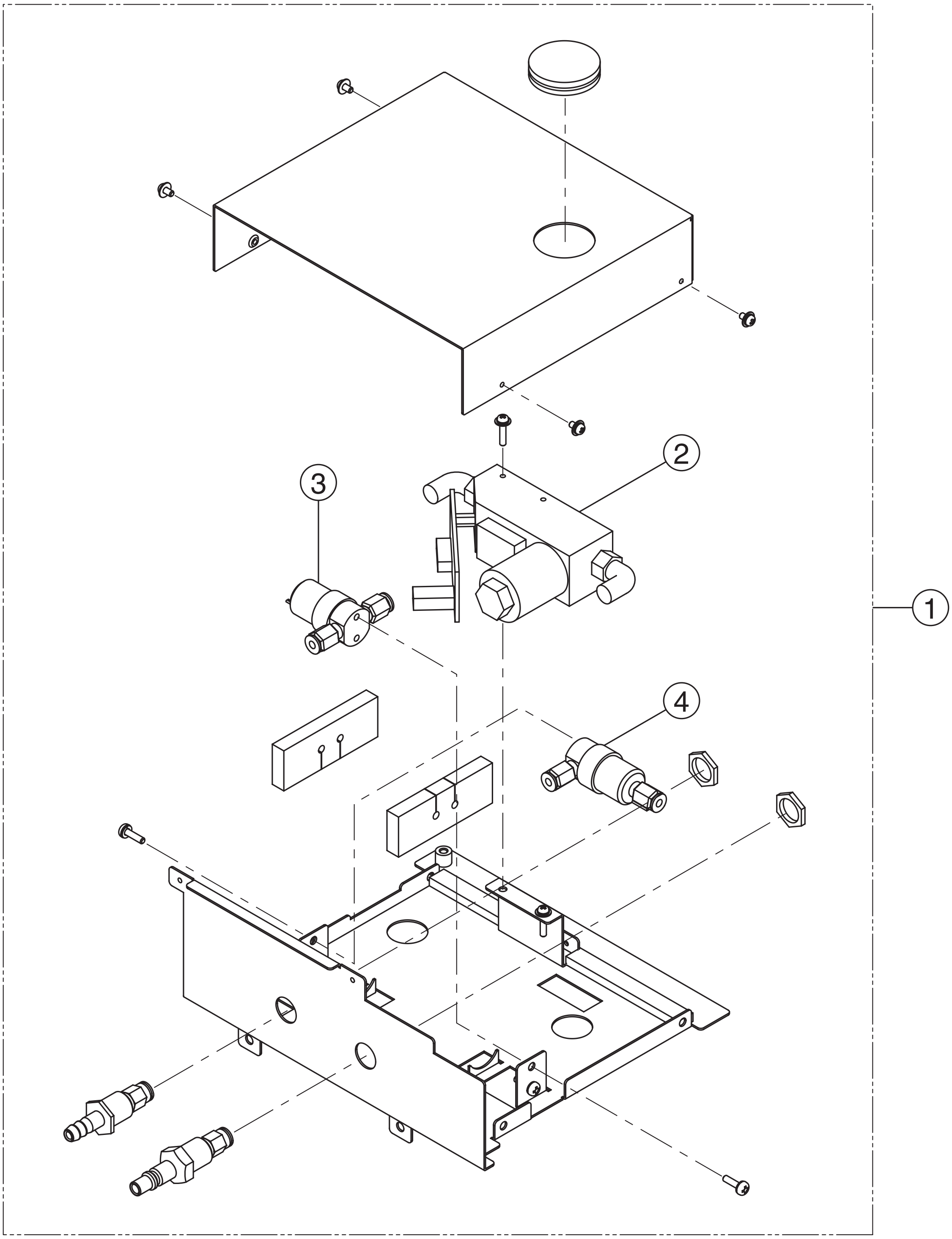

Fig-10

Fig-No.	Part Name	Part No.
10-1	Oxygen controller	98615
10-2	Mass flow valve	98645
10-3	Solenoid valve, NC type (with joint)	98736
10-4	Solenoid valve, NO type (with joint)	98735

9-11. Fig-11 Upper and Lower Sections of the Main Body and Filter Case Assembly

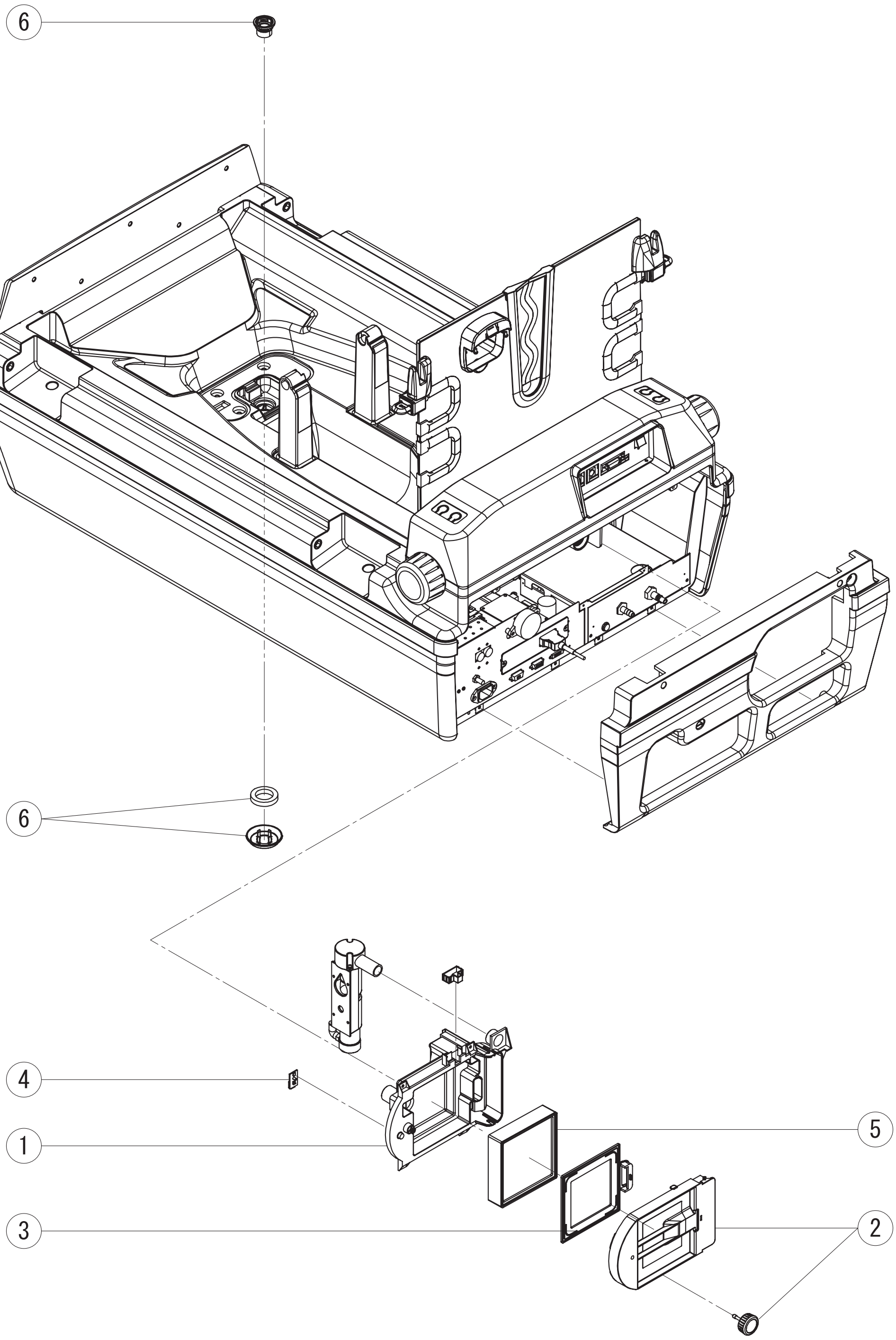

Fig-11

Fig-No.	Part Name	Part No.
11-1	Filter box	98648
11-2	Filter cover	98649
11-3	Filter packing	98650
11-4	Position detection board	98582
11-5	Pneumoclean (electrostatic air filter)	60269
11-6	Steam gate	98651

9-12. Fig-12 Stand

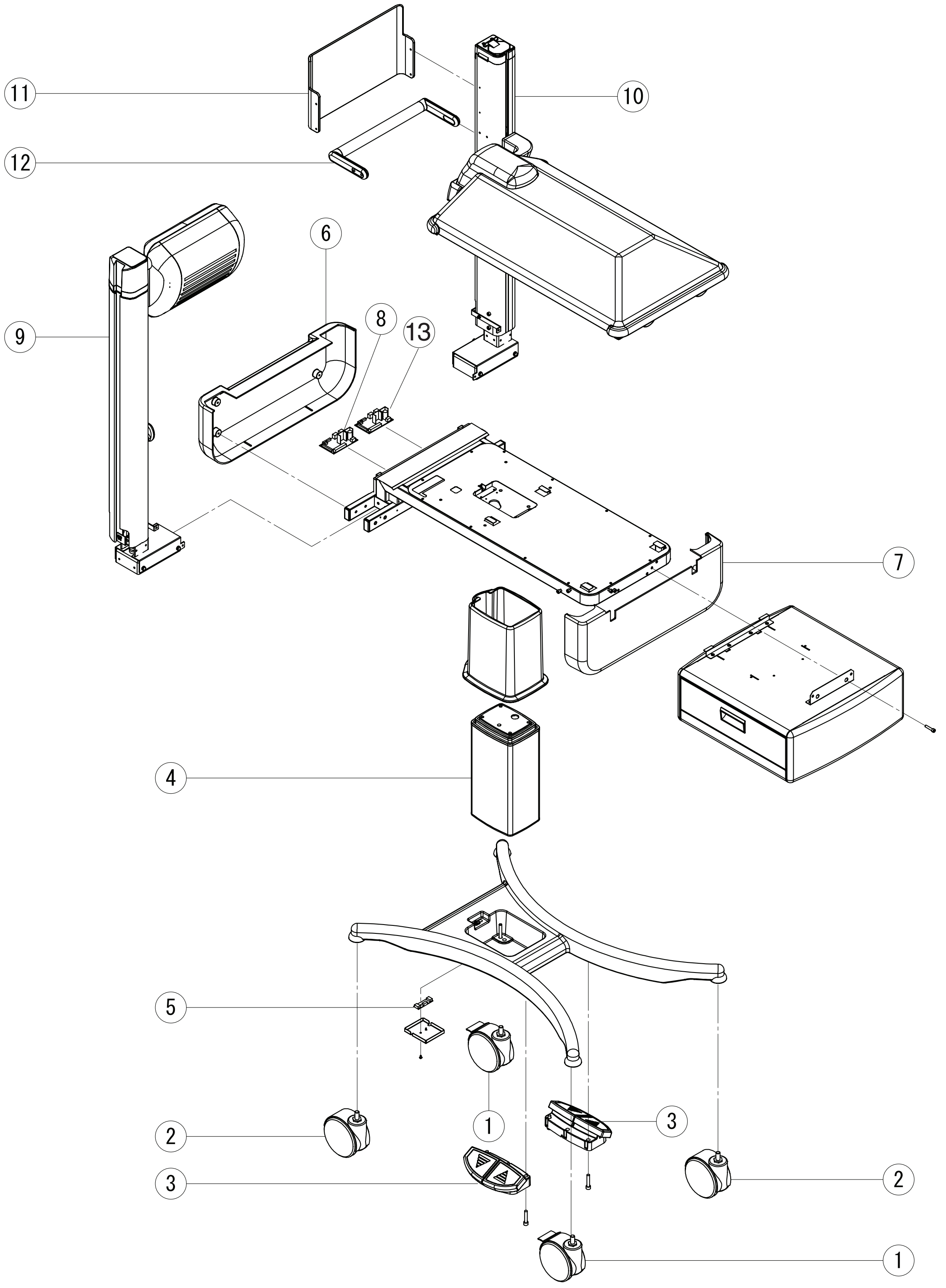
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Fig-12

Fig-No.	Part Name	Part No.
12-1	Caster (with stopper)	99207
	Conductive caster (with stopper)	98652
12-2	Caster	99208
	Conductive caster	98653
12-3	Foot switch	95687
12-4	Hi-Low stand actuator	98216
12-5	Relay board for foot switch	95686
12-6	F-rail pole under cover (rear)	98654
12-7	F-rail pole under cover (front)	98655
12-8	Hi-Low drive board for radiant warmer	98733
12-9	Radiant warmer (AC120V) (with F-rail, height adjustment unit)	98745
	Radiant warmer (AC230V) (with F-rail, height adjustment unit)	98746
12-10	Canopy (with Hi-Low unit)	98657
12-11	Radiant warmer cover	98658
12-12	Handle	98659
12-13	Hi-Low drive board for canopy	98734

9-13. Fig-13 Stand

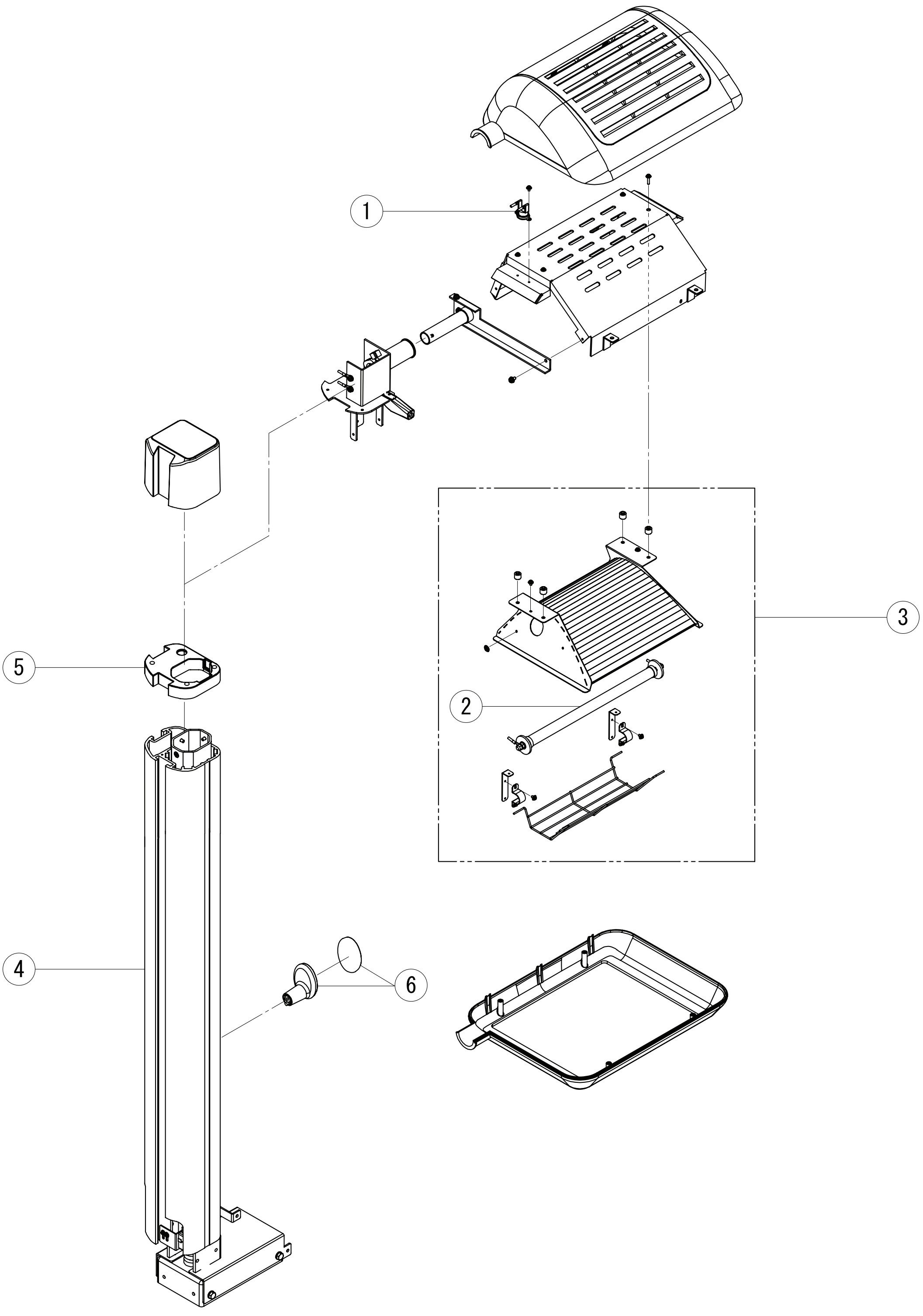


Fig-13

Fig-No.	Part Name	Part No.
13-1	Disc-type thermostat for radiant warmer	98660
13-2	Heater for radiant warmer (AC120V)	98662
	Heater for radiant warmer (AC230V)	98663
13-3	Heater module (AC120V)	98665
	Heater module (AC230V)	98666
13-4	F-rail pole for radiant warmer (with actuator)	98667
13-5	F-rail pole spacer for radiant warmer	98668
13-6	Cord cleat	95684

9-14. Fig-14 Canopy

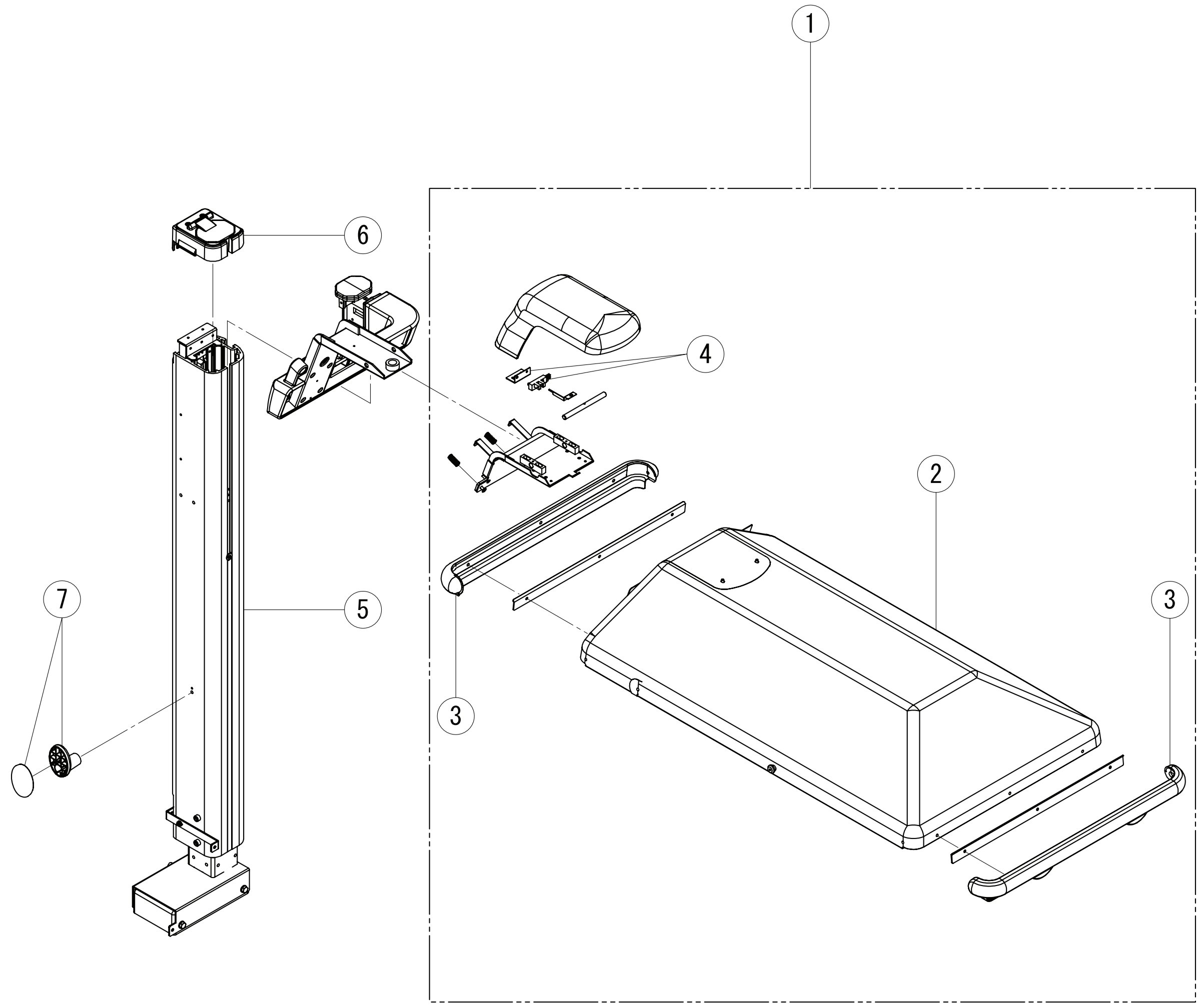


Fig-14

Fig-No.	Part Name	Part No.
14-1	Canopy (with canopy arm)	98669
14-2	Canopy (with packing)	98670
14-3	Canopy packing	98671
14-4	Photomicroswitch	98672
14-5	F-rail pole for canopy (with actuator)	98673
14-6	F-rail pole top cover for canopy	98674
14-7	Cord cleat	95684

9-15. Fig-15 Pulse Oximeter (Masimo)

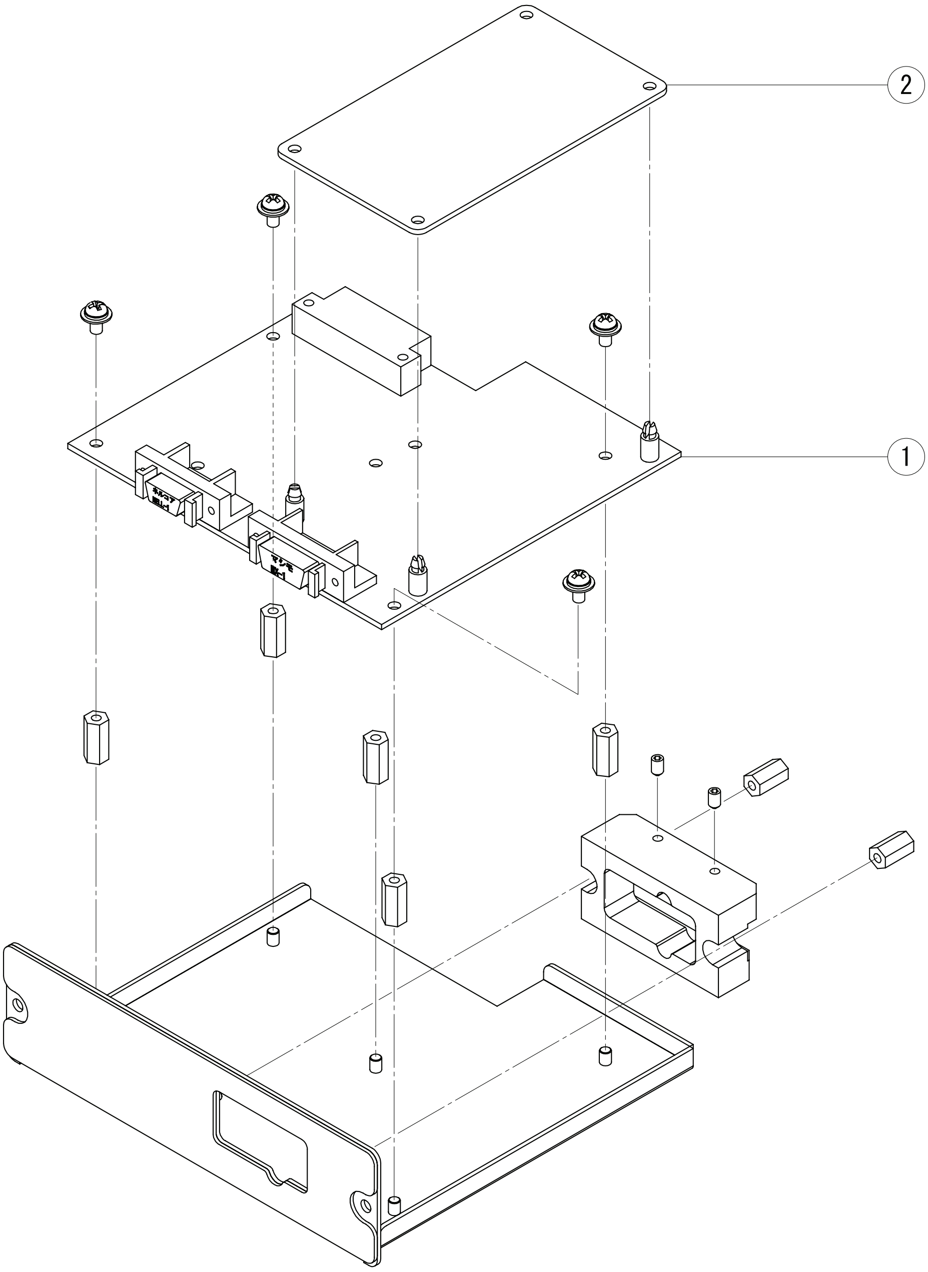


Fig-15

Fig-No.	Part Name	Part No.
15-1	Insulating substrate for SpO_2 unit	95642
15-2	SpO_2 board (Masimo)	95640

9-16. Fig-16 Pulse Oximeter (Nellcor)

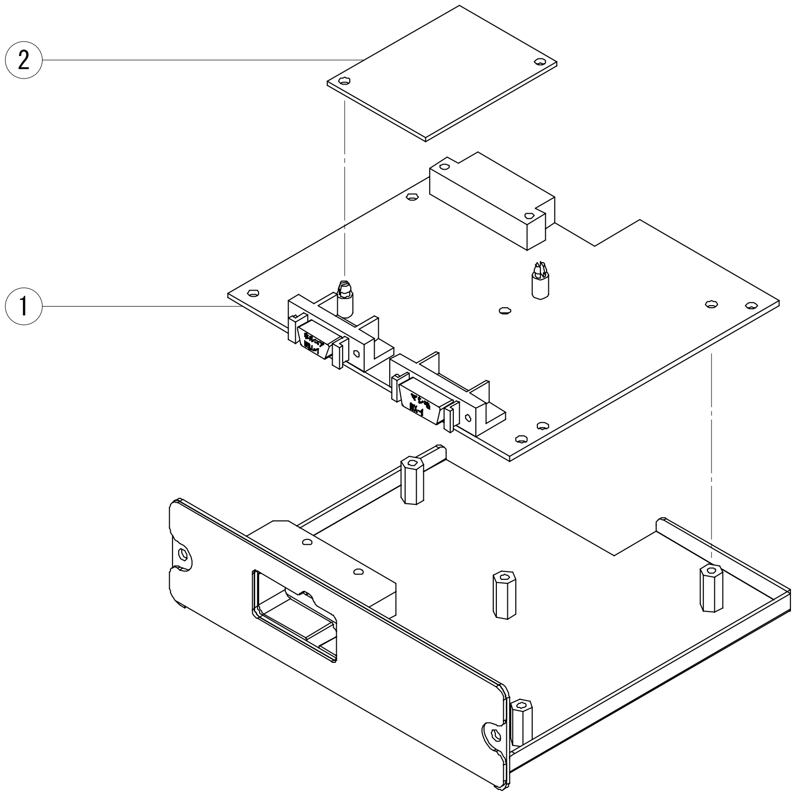


Fig-16

Fig-No.	Part Name	Part No.
16-1	Insulating substrate for SpO_2 unit	95642
16-2	SpO_2 board (Nellcor)	95641

[10] Technical Information

10-1. Technical Data

Power requirements	Customer specified ■ for 200V region Rating: AC230V; power consumption 800VA; frequency 50/60Hz Operating voltage range: AC230V±10% ■ for 100V region Rating: AC120V; power consumption 800VA; frequency 60Hz Operating voltage range: AC120V±10%
Classification	Type of protection: Class1 equipment Degree of protection: Type BF applied part Not for use in an air and flammable anesthetic gas mixture or an oxygen/nitrous oxide and flammable anesthetic gas mixture Mode of operation: Continuous operation (the Hi-Low stand is designed for intermittent operation of 3 minutes per hour)
External display	Type: Liquid crystal (TFT-LCD) Size: 8.5 inches Dot formation: 800 × 480 dots Number of colors: 256 colors
Operating conditions	Ambient temperature: 20~30°C Relative humidity: 30~75% Atmospheric pressure: 70~106kPa Wind velocity: <0.3m/s
Storage conditions	Ambient temperature: 0~50°C Relative humidity: 30~75% Atmospheric pressure: 70~106kPa
Maximum load capacity	Dovetail rail: Approx. 20kg I.V. pole (option): Approx. 10kg Drawer (option): Approx. 3kg ✻ Total load capacity of the dovetail rail and the I.V. pole is approx. 30kg.
Dimensions	Main body (with the Hi-Low stand): 119(W) × 68(D) × 138~226(H) cm (excluding the display) Mattress surface 80~120cm in height Mattress surface (with the weight monitor) 81.5~121.5cm in height External display: 24.5(W) × 6.5(D) × 16(H) cm Mattress: 65(W) × 36.5(D) × 2(T) cm
Weight	Approx. 128kg (approx. 132kg if the unit includes the weight monitor)
Accessories	Skin temp probe .... 1 Oxygen sensor .... 2 Pneumoclean (Electrostatic air filter) .... 1 Piping connecting hose .... 1 Dust cover .... 1 Operation Manual 1

■ Temperature (incubator mode)

Control mode	Manual control/servo control (selectable)
Setting range	Skin temperature (servo control): 34.0~37.5°C (override mode: 37.6~38.0°C) Incubator air temperature (manual control): 23.0~37.0°C (override mode: 37.1~39.0°C)
Display range	Skin temperature: 30.0~42.0°C Accuracy: ±0.3°C Incubator air temperature: 20.0~42.0°C Accuracy: ±0.3°C
Heater output	0~100 %(indicated in 10 levels)
Warm-up time	≦60min at ambient temperature 25°C
Alarms	High temperature, set temperature, skin temperature probe

■ Temperature (radiant warmer mode)

Control mode	Manual control/servo control
Heater capacity	500W
Skin temperature display range	30.0~42.0°C
Skin temperature display accuracy	±0.3°C
Skin temperature setting range	34.0~37.5°C 37.6~38.0°C (override mode)
Heater output setting range	0~100% (in 5% increments)
Heater output indication	In 10 levels
Elapsed warming time indication	If the heater output setting is 35% or higher in manual control operation, audible and visual indications are given every 15 minutes of warming.
Alarms	Set temperature, baby check, skin temperature probe

■ Timer (radiant warmer mode)

Timer mode	Apgar, CPR
Time display range	0~60 minutes
Time display unit	1 second
Apgar timer	Settings of the Apgar chime: 1, 3, 5 and 10 minutes
CPR (including the Apgar timer function)	Interval between each chime: 30 seconds Operation of the second counter: 6 sec. × 2 Settings of the Apgar chime: 1, 3, 5 and 10 minutes

■ Humidity

Control mode	Servo control
Setting range	40~95% Rh (in 1% increments)
Display range	15~99% Rh Accuracy: ±10%Rh
Continuous humidification without supplying water	≧ 8 hours
Maximum humidity	≧ 90%Rh (at ambient humidity 50% Rh, ambient temperature 25°C, incubator air temperature setting 37°C)
Alarms	Humidity sensor, low water level, no water, humidity chamber off, set humidity

■ Oxygen supply

Maximum oxygen concentration	≧ 65% O_2 (at O_2 flow rate 10L/min)

■ Environment

CO_2 concentration in the hood	When the air mixed with 4% CO_2 is administered to a point 10cm above the center of the mattress at 750mL/min and a stable state is achieved, the CO_2 concentration in the hood should not exceed 0.4%.

■ Pulse oximeter[*1,5,6,7] (Masimo)

SpO_2	
Display range: 1~100%	
Accuracy (in 70~100%)	: ±3 digits (during no motion conditions)[*2]
	: ±3 digits (during motion conditions)[*3]
	: ±3 digits (during low perfusion conditions)[*4]
Update cycle: 1 second	
Alarm function	
Setting range:	Upper limit: OFF, 50~99% (in 1% increments)[*8]
	Lower limit: OFF, 45~95% (in 1% increments)[*8]
Pulse	
Display range: 25~240bpm	
Accuracy (in 25~240bpm)	: ±3 digits (during no motion conditions)[*2]
	: ±5 digits (during motion conditions)[*3]
	: ±3 digits (during low perfusion conditions)[*4]
Update cycle: 1 second	
Alarm function	
Setting range:	Upper limit: OFF, 80~240bpm (in 5bpm increments)[*8]
	Lower limit: OFF, 35~180bpm (in 5bpm increments)[*8]
Sensor	Wavelength: 660nm (rd) 905nm (ir) Brightness: ≦ 15mW Non-sterile, latex-free

Mode	Averaging time: 4, 6, 8, 10, 12, 14, 16 seconds (selectable)[*8] (factory default: 8 seconds) Sensitivity setting: APOD, Normal (normal sensitivity), Max (high sensitivity)[*8] (factory default: Max) FastSat: ON, OFF[*8](factory default: OFF)

✻1 This device is calibrated to display functional oxygen saturation.

✻2 SpO_2 70~100% hypoxia was induced in healthy male and female adult volunteers with light skin and dark skin. Accuracy was checked in no motion conditions against a laboratory CO-oximeter and an ECG monitor. Variability distribution at this accuracy was ±1SD. ±1SD covers 68% of all data.

✻3 SpO_2 70~100% hypoxia was induced in healthy male and female adult volunteers with light skin and dark skin. Accuracy was checked by 1~2cm tapping 2~4 times per second and by 2~3cm irregular tapping 1~5 times per second against a laboratory CO-oximeter and an ECG monitor. Variability distribution at this accuracy was ±1SD. ±1SD covers 68% of all data.

✻4 In a laboratory test, in the range of 70~100% SpO_2, accuracy in low perfusion conditions was checked against the Biotec Index2 Simulator and the Masimo Simulator, both of whose signal strength is 0.02% or more and permeability 5% or more. Variability distribution at this accuracy was ±1SD. ±1SD covers 68% of all data.

✻5 The materials accessible to the patient and the user comply with ISO 10993-1.

✻6 All the sensors and patient cables that can be used with this device have been tested and verified by using the Masimo/MX-1 module pulse oximeter technology.

✻7 Since the measurements taken by the pulse oximetry equipment are statistically distributed, only about two-thirds of them fall in the accuracy (Arms) range of values obtained with a CO-oximeter.

✻8 Even if the power supply is interrupted due to power failure, disconnection of the power plug, or some other cause, the preselected settings will be retained in the memory. When the power supply is resumed, the unit will start operation with the last selected settings.

✻9 The above specifications apply when the sensor and the patient cable specified by Atom are used. For information on the sensor and the patient cable specified by Atom, contact your local Atom representative.

✻10 A functional tester cannot be used to assess the accuracy of a pulse oximeter probe or a pulse oximeter monitor.

✻11 If it is independently demonstrated that a particular calibration curve is accurate for the combination of a pulse oximeter monitor and a pulse oximeter probe, then a functional tester can measure the contribution of the monitor to the total error of the monitor/probe system. It can measure how accurately the particular pulse oximeter monitor is reproducing the calibration curve.

■ Pulse oximeter[*3,4] (Nellcor)

SpO_2

Display range: 1~100%
Accuracy (in 70~100%) : ±3 digits (during no motion conditions)[*1]
: ±3 digits (during low perfusion conditions)[*2]
Update cycle: 2 second
Alarm function
Setting range: Upper limit: OFF, 50~99% (in 1% increments)[*5]
Lower limit: OFF, 45~95% (in 1% increments)[*6]

Pulse

Display range: 25~240bpm
Accuracy (in 25~240bpm) : ±3 digits (during no motion conditions)[*1]
: ±3 digits (during low perfusion conditions)[*2]
Update cycle: 2 second
Alarm function
Setting range: Upper limit: OFF, 80~240bpm (in 5bpm increments)[*6]
Lower limit: OFF, 35~180bpm (in 5bpm increments)[*6]

Sensor

Wavelength: 660nm (rd) 900nm (ir)
Brightness: <15mW
EOG sterilized, latex-free

Mode

SatSeconds: OFF, 10, 25, 50, 100 (selectable)[*6]
(factory default: OFF)
Response mode: Normal, Fast
(factory default: Normal)[*6]

✻1 Subjects used to validate SpO_2 measurement accuracies were healthy and recruited from the local population. Comprised of both men and women, subjects spanned a range of skin pigmentations and ranged in age from 18-50 years old. Accuracy specifications are based on controlled hypoxia studies with healthy non-smoking adult volunteers over the specified SpO_2 range(s). Pulse oximeter SpO_2 readings were compared with SaO_2 values of drawn blood samples measured by hemoximetry. All accuracies are expressed as ±1SD. Pulse oximeter equipment measurements are statistically distributed; about two-thirds of pulse oximeter measurements are expected to fall in this accuracy (Arms) range. Because scatter and bias of pulse oximter SpO_2 and blood SaO_2 comparison commonly increase as the saturation decreases, and accuracy specifications are calculated from data spanning the stated range, different accuracy values may result when describing partially overlapping ranges.

✻2 Reading accuracy in low perfusion conditions (detected IR pulse modulation amplitude 0.03~1.5%) was verified by using signals supplied by a patient simulator. SpO_2 and pulse rate values were varied across the monitoring range over a range of weak signal conditions and compared with the known true SpO_2 and pulse rate values of the input signals.

✻3 The materials accessible to the patient and the user comply with ISO 10993-1.

✻4 All the sensors and patient cables that can be used with this device have been tested and verified by using the Nellcor/NELL-1 module pulse oximeter technology.

✻5 Even if the power supply should be interrupted due to power failure, disconnection of the power plug or some other cause, the preselected settings will be retained in the memory. When the power supply is resumed, the unit will start operation with the last selected settings.

✻6 This device is calibrated to display functional oxygen saturation.

＊7 A functional tester cannot be used to assess the accuracy of a pulse oximeter probe or a pulse oximeter monotor.

＊8 If it is independently demonstrated that a particular calibration curve is accurate for the combination of a pulse oximeter monitor and a pulse oximeter probe, then a functional tester can measure the contribution of the monitor to the total error of the monitor/probe system. It can measure how accurately the particular pulse oximeter monitor is reproducing the calibration curve.

■ Oxygen control (oxygen controller)

Control mode	Servo control
Setting range	22~65% (in 1% increments)
Display range	15~105%
Response time for display	30sec (90% response)
Oxygen supply pressure	294~490kPa (3~5kgf/cm^2)
Type of oxygen sensor	Galvanic cell type
Measurement range	15~100%
Measurement accuracy	±2% O_2 (15~25%O_2) ±3%O_2 (25~100%O_2)
Calibration	21% O_2
Alarms	Oxygen sensor, oxygen concentration, oxygen flow rate, oxygen sensor not calibrated
Oxygen sensor life span	The life span of the oxygen sensor varies depending on the ambient conditions under which it is used. It is recommended to replace the oxygen sensor when more than one year has passed since it was taken out of its package.

■ Weight monitor (the unit equipped with the weight monitor unit)

Weighing range	300~7000g (in automatic weighing)
Weighing accuracy	±5g
Scale interval	1g
Weighing mode	Manual, automatic

■ Other alarms

Fan, system failure, power failure

- The product meets the EMC requirements of IEC 60601-1-2: 2001.

10-2. EMC Level and Classification

Guidance and manufacturer's declaration – electromagnetic emissions

The Dual Incu *i* is intended for use in the electromagnetic environment specified below. The customer or the user of the Dual Incu *i* should assure that it is used in such an environment.

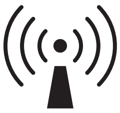
Emissions test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The Dual Incu *i* uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The Dual Incu *i* is suitable for use in all establishments, other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions* IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions* IEC 61000-3-3	Complies	

✻ There are no prescribed demands for tests in 100V areas.

Guidance and manufacturer's declaration – electromagnetic immunity			
The Dual Incu *i* is intended for use in the electromagnetic environment specified below. The customer or the user of the Dual Incu *i* should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6kV contact ±8kV air	±6kV contact ±8kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2kV for power supply lines ±1kV for input/output lines	±2kV for power supply lines ±1kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1kV differential mode ±2kV common mode	±1kV differential mode ±2kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Dual Incu *i* requires continued operation during power mains interruptions, it is recommended that the Dual Incu *i* be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Note: U_T is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration – electromagnetic immunity

The Dual Incu *i* is intended for use in the electromagnetic environment specified below. The customer or the user of the Dual Incu *i* should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the Dual Incu *i*, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance
Conducted RF IEC 61000-4-6	3Vrms 150kHz to 80MHz outside ISM bands✻a	3Vrms	$d = 1.2\sqrt{P}$
	10Vrms 150kHz to 80MHz in ISM bands✻a	10Vrms	$d = 1.2\sqrt{P}$
Radiated RF IEC 61000-4-3	3V/m 80MHz to 2.5GHz The equipment continues to perform its intended function. 10V/m 80MHz to 2.5GHz The equipment continues to perform its intended function or stops without causing any harm.	10V/m	$d = 1.2\sqrt{P}$ 80MHz to 800MHz $d = 2.3\sqrt{P}$ 800MHz to 2.5GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).✻b Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,✻c should be less than the compliance level in each frequency range.✻d Interference may occur in the vicinity of equipment marked with the following symbol.: 

Note 1: At 80MHz and 800MHz, the higher frequency range applies.
Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

✻a The ISM (industrial, scientific, and medical) bands between 150kHz and 80MHz are 6.765MHz to 6.795MHz; 13.553MHz to 13.567MHz; 26.957MHz to 27.283MHz; and 40.66MHz to 40.70MHz.

✻b The ISM compliance level in the ISM frequency band between 150kHz and 80MHz and in the frequency range 80MHz to 2.5GHz are intended to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas. For this reason an additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in these frequency ranges.

✻c Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radio, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Dual Incu *i* is used exceeds the applicable RF compliance level above, the Dual Incu *i* should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Dual Incu *i*.

✻d Over the frequency range 150kHz to 80MHz, field strengths should be less than 3V/m.

Recommended separation distances between portable and mobile RF communications equipment and the Dual Incu *i*

The Dual Incu *i* is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Dual Incu *i* can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Dual Incu *i* as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)			
	150kHz to 80MHz outside ISM bands $d = 1.2\sqrt{P}$	150kHz to 80MHz in ISM bands $d = 1.2\sqrt{P}$	80MHz to 800MHz $d = 1.2\sqrt{P}$	800MHz to 2.5GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.12	0.23
0.1	0.38	0.38	0.38	0.73
1	1.2	1.2	1.2	2.3
10	3.8	3.8	3.8	7.3
100	12	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be determined using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note 1: At 80MHz and 800MHz, the separation distance for the higher frequency range applies.

Note 2: The ISM (industrial, scientific, and medical) bands between 150kHz and 80MHz are 6.765MHz to 6.795MHz; 13.553MHz to 13.567MHz; 26.957MHz to 27.283MHz; and 40.66MHz to 40.70MHz.

Note 3: An additional factor of 10/3 is used in calculating the recommended separation distance for the transmitters in the ISM frequency band between 150kHz and 80MHz and in the frequency range 80MHz to 2.5GHz to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas.

Note 4: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[11] Disposal

The medical institution concerned is responsible for proper disposal of the main body, old parts past their expected life span and disposables in accordance with applicable waste disposal laws and regulations.

A rechargeable NiMH battery, a button type lithium battery and oxygen sensors are used in this unit. Dispose of the batteries and the oxygen sensors properly by observing applicable laws and regulations.

- Reproduction of all or part of this Manual without permission from Atom Medical Corporation is strictly prohibited.
- The contents of this Manual are subject to change without notice due to technical improvement.
- All possible measures have been taken to ensure the accuracy of the contents of this Manual. However, if any errors should be noticed, Atom would greatly appreciate being informed of them.

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